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# Marine Fisheries Abstracts

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# Marine Fisheries Abstracts


UNITED STATES DEPARTMENT OF COMMERCE

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## FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Marine Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

*Marine Fisheries Abstracts* contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

0.12 (2.3) SHRIMP CLEANING DEVICE

Adams, Michael L. (1312 S. Washington, Park Ridge, Ill.) (pat.)
U.S. Patent 3,777,333
Official Gazette of the U.S. Patent Office 917, No. 2, 418 (Dec. 11, 1973)

This device is used to devein, to clean, and to remove the shell from the shrimp meat. FTP



0.12 (2.3) APPARATUS FOR EXTRACTING CRAB MEAT

Bolsvert, Albert E. (Maswamsicut Lake Dr., North Scituate, R.I.) (pat.)
U.S. Patent 3,777,332
Official Gazette of the U.S. Patent Office 917, No. 2, 418 (Dec. 11, 1973)

This apparatus is used for squeezing meat from the claws and flippers of cooked crabs and for preparing the body for further processing. FTP

0.12 (0.8) TREATMENT OF WASTEWATERS FROM THE PROCESSING OF FISH

Pavia, Edgar H., and Amulya D. Tyagi; assignors to Pavia-Byrne Engineering Corp., New Orleans, La. (pat.)
U.S. Patent 3,787,596
Official Gazette of the U.S. Patent Office 918, No. 4, 1583 (Jan. 22, 1974)

Emulsified wastewater from fish processing plants is treated by (1) degassifying the wastewater to break the emulsion and to remove toxic gases and (2) separating solids and oil. This treated water can be reused for transport of the fish during unloading from the fishing boats. FTP



0.35 (0.36) METABOLIC AND HEMATOLOGICAL STUDIES ON THE YELLOW AND SILVER PHASES OF THE EUROPEAN EEL, ANGUILLA ANGUILLA L.-- I. CARBOHYDRATE, LIPID, PROTEIN AND INORGANIC ION METABOLISM

Lewander, Kerstin, Göran Dave, Maj-Lis Johansson, Åke Larsson, and Ulf Lidman (Dept. of Zoophysiology, University of Göteborg, Fack, S-400 33 Göteborg 33, Sweden)
Comparative Biochemistry and Physiology 47, No. 3B, 571-581 (Mar. 15, 1974)

The purpose of this study was to determine the metabolic differences between yellow eels and silver eels of approximately the same size and caught at the same locality. The yellow eel is the sexually immature form; during the summer and autumn of its year of spawning migration, the yellow eel is successively changed towards the silver eel phase. The transformation from the yellow to the silver eel involves many morphological, physiological, and behavioral changes. In this study the contents of different metabolites were determined in the white muscle, dark muscle, liver, blood, and gonads in both the yellow and silver phase of the European eel.

The silver eels showed an enhanced redistribution and utilization of fat in addition to changed carbohydrate and protein metabolism. There was a pronounced development of the dark muscle in the silver eels indicating an adaptation for the spawning migration. The iron and water balance of the blood was unaffected. The metabolic changes are probably due to an altered hormone balance. The plasma cortisol level in the silver eels was lower than that in the yellow eels; further studies are needed to elucidate the metabolic role of this hormone in the eel. [3 tables, 35 references]



0.4 (9.19) THE TOXICITY OF POLYCHLORINATED POLYCYCLIC COMPOUNDS AND RELATED CHEMICALS

Kimbrough, Renate D. (Chamblee Toxicology Laboratory, Chamblee, Ga.)
CRC Critical Reviews in Toxicology 2, No. 4, 445-498 (1974)

This review covers the toxicity of biphenyls, polychlorinated biphenyls, terphenyls, polychlorinated terphenyls, chlorinated dibenzofurans, chlorinated dibenzodioxins, fenticlor, bithionol, tetrachlorosalicylanilide, trichlorocarbanilide, chlorinated naphthalenes, dichlorophene, hexachlorophene, and triclosan in animals and men. Information is given on the development, usage, and occurrence of some of these compounds. Also mentioned are the chemical methods used to determine the compounds in various tissues and in environmental samples. Information is given on the storage, distribution, excretion, and metabolism of some of the compounds; the biochemical effects are also described.
[8 figures, 2 tables, 313 references] FTP

0.19 (9.12) ACOUSTIC TELEMETRY FROM FISH

Kanwisher, John, and Kenneth Lawson (Woods Hole Oceanographic Institution, Woods Hole, MA 02543), and Gunnar Sundnes (University of Trondheim, Trondheim, Norway)
Fishery Bulletin 72, No. 2, 251-255 (Apr. 1974)

By means of acoustic telemetry the behavior and physiology of fish may be studied under approximately natural conditions. Small battery operated electronic devices can transmit data on heartbeat and temperature up to several hundred meters for as long as a month. In this article, the authors describe the use of sound waves for monitoring physiological information. They discuss the construction of devices for transmitting, receiving, and interpreting the data. Finally, they show how acoustic devices have been applied to specific problems and discuss the results obtained.
[5 figures, 4 references] FTP

0.35 (0.36) METABOLIC AND HEMATOLOGICAL STUDIES ON THE YELLOW AND SILVER PHASES OF THE EUROPEAN EEL, ANGUILLA ANGUILLA L.-- III. HEMATOLOGY

Johansson, Maj-Lis, Göran Dave, Åke Larsson, Kerstin Lewander, and Ulf Lidman (Dept. of Zoophysiology, University of Göteborg, Fack, S-400 33 Göteborg 33, Comparative Biochemistry and Physiology 47, No. 3B, 593-599 (Mar. 15, 1974)

The purpose of this part of the overall study was to find out whether there were any marked hematological differences between yellow and silver eels of similar size and captured from the same locality. The following hematological parameters were examined: cell differentation, cell sizes, cell numbers, hematocrit value, hemoglobin content, and mean erythrocyte hemoglobin content.

There were no differences in cell differentiation, numbers, and sizes of the white blood cells between the yellow eel and silver eel phases. The two phases of eels showed significant differences in hematocrit and hemoglobin values; however, the mean erythrocyte hemoglobin content and the size of the erythrocytes were the same in both phases. The authors indicate that the higher erythrocyte count in the silver phase could be due to higher erythropoiesis or increased release of erythrocytes from erythropoietic and erythrocyte-storing tissues.
[2 figures, 4 tables, 21 references] FTP

0.12 (2.3) FISH CLEANING APPARATUS

Hogan, Elmer R., and John I. Simpson; assignors to Smith-Berger Manufacturing Corp., Seattle, Wash. (pat.)
U.S. Patent 3,785,007
Official Gazette of the U.S. Patent Office 918, No. 3, 933 (Jan. 15, 1974)

This fish-scaling machine has a horizontally disposed fish conveyor equipped with a series of spaced descaler rolls. FTP

0.12 (2.3) FISH SCALING MACHINE

Simard, Albert (R.R. 01, Old Castle, Ontario, Canada) (pat.)
U.S. Patent 3,787,927
Official Gazette of the U.S. Patent Office 918, No. 5, 1703 (Jan. 29, 1974)

0.35 (0.36)

II. Fatty Acid Composition, Kerstin Lewander, Göran Dave, Maj-Lis Johansson, Åke Larsson, and Ulf Lidman. Ibid. pp. 583-591.

This part of the study involved an examination of fatty acid compositions of the liver, muscle, and gonad lipids of the yellow and silver eels. The fatty acid composition was determined by gas-liquid chromatography.

The gonads of the silver eels contained significantly higher levels of n-tetradecanol and n-hexadecanol than those of the yellow eels. The gonads of the silver eels had significantly higher amounts of palmitoleic (16:1), oleic (18:1), and linoleic (18:2) acids and lower amounts of palmitic acid (16:0) than did those of the yellow eels.

In the liver, stearic acid (18:0) and arachidonic acid (20:4) levels were lower and linoleic acid (18:2) level was higher in the silver eel phase than that in the yellow eel.

There was no significant difference in the fatty acid composition of the white muscle between the yellow eels and the silver eels.
[2 figures, 4 tables, 26 references] FTP

0.4 (7.9) INSTITUTE OF LABORATORY ANIMAL RESOURCES

Anderson, M. J., R. H. Yager, and C. B. Frank (Div. of Biological Sciences, Assembly of Life Sciences, National Research Council, Washington, DC 20418)
Federation Proceedings 33, No. 4, 1036-1038 (Apr. 1974)

The Institute of Laboratory Animal Resources (ILAR) was founded in 1952 as a coordinating agency to disseminate information, survey existing and required resources, establish guidelines, and generally assist in developing laboratory animal resources in the United States. ILAR is part of the Division of Biological Sciences, Assembly of Life Sciences of the National Research Council, National Academy of Sciences. Specifically, the objectives of ILAR include (1) to collect and disseminate information relative to sources, transportation, breeding theory and practice, disease (prevention, diagnosis, and treatment), and appropriate utilization of laboratory animals; (2) to improve the supply of laboratory animals by providing information to suppliers and breeders of the quality of the species and strains relevant to laboratory science management and care; (3) to serve as a forum for the exchange, evaluation, and dissemination of pertinent information valuable to suppliers, breeders, and users of laboratory animals; (4) to coordinate and implement the international exchange of information; (5) to respond to ecologic, economic, and legislative activities relative to the effective, jucicious, and humane use of laboratory animals; (6) to develop standards relative to the conformation, descriptive terminology, and variables for current and potential laboratory animals and facilities.



0.5 (2.05) SURVIVAL OF VIBRIO PARAHAEMOLYTICUS IN COOKED SEAFOOD AT REFRIGERATION TEMPERATURES

Bradshaw, Joe G., David W. Francis, and Robert M. Twedt (Div. of Microbiology, Public Health Service, Food and Drug Administration, Cincinnati, OH 45226)
Applied Microbiology 27, No. 4, 657-666 (Apr. 1974)

Recent outbreaks of food poisoning have been associated with the consumption of crab or shrimp contaminated with strains of the facultative halophile V. parahaemolyticus. These organisms have shown generation times as low as 12 min in inoculated marine fish. Earlier reports indicate minimal temperatures for V. parahaemolyticus were 5° and 8° C in artificial media, and 10° C in oyster meat homogenate and the marine environment. Earlier records show temperatures as high as 12.8° C in refrigerated showcases, 10° C in domestic refrigerators, and 15.6° C in coolers used in the blue crab industry. Such deviations from optimum storage temperatures might permit multiplication of V. parahaemolyticus in contaminated seafoods. The purpose of the present study, thus, was to determine the effects of storage temperatures, representative of both good and poor refrigeration, on the growth and survival of V. parahaemolyticus on the surface of cooked shrimp and crab meat. Two strains of V. parahaemolyticus were used in these tests. The organisms were surface inoculated on cooked shrimp, shrimp with sauce, and cooked crab meat. The samples were stored at various temperatures (1.6°, 7.2°, 10.0°, 12.8°, and 18.3° C) for 48 h.

The organisms grew well on cooked shrimp and crab meat at 18.3° C; their numbers declined gradually at storage temperatures of 10° C and lower. At 12.8° C,



0.6 SINGLE-CELL PROTEIN IN PERSPECTIVE

Lipinsky, E. S., and J. H. Litchfield (Battelle Columbus Laboratories, 505 King Ave., Columbus, OH 43201)
Food Technology 28, No. 5, 16, 18, 20, 22, 24, 40 (May 1974)

Large increases in the prices of animal products and animal feed ingredients have renewed interest in the commercial production of single-cell protein (SCP)--cells from algae, bacteria, fungi, and yeasts for use as a source of protein. Previously it was considered that large-scale use of SCP was not economically competitive. The status and future prospects are reviewed for the major SCP products, their potential applications, and the barriers that stand between current state of the art and large-scale acceptance. Information is presented on the various substrates studied for producing SCP, the pilot scale processes developed, nutritional value of SCP products, safety requirements for use of SCP in foods, improving the functional characteristics of SCP, applications, and costs and price considerations in the use of SCP.
[4 figures, 2 tables, 87 references] FTP



0.6 (0.32)(9.6) NEW PROTEIN FOODS VOLUME 1A TECHNOLOGY

Altschul, Aaron M. (editor) (Georgetown University School of Medicine, Washington, D.C.)
Academic Press, Inc., New York, NY 10003 (1974), xiv + 511 pp.

In the search to increase the protein supply there is a related need to provide the literature which describes what has been done, what can be carried out, and suggests future needs. The author's intent is to produce a three-volume treatise on these subjects. This first volume, 1A, deals with new protein technologies which are used to transform existing sources of proteins into better or more useful sources of protein. The book consists of the following chapters and subjects.

Chapter I, "Protein Food Technologies and the Politics of Food: An Overview," by Aaron M. Altschul. The following major topics are discussed: food problems and political imperatives; the role of protein in foods; methods for increasing protein supplies; new food technologies; and the position of Government politics in relation to the scientific and technological community. Chapter II, "The Amino Acid Fortification of Cereals," by G. R. Jansen. This chapter contains discussions on protein requirements; the rationale for addition of amino acids; experimental studies on humans and animals; and related aspects and practical considerations. Chapter III, "The Amino Acid Fortification of Intact Cereal Grains," by Hisateru Mistuda and Kyoden Yasumoto. The topics in this chapter include the techniques of fortification; quality and safety of product; nutritional impact on rice fortification; and other aspects of cereal fortification. Chapter IV, "The

0.5 (2.05)

the organisms tended to remain static; thus, it appears that 12.8° C is the borderline temperature for growth of the organisms on cooked seafood. When a commercial-type seafood cocktail sauce was added to surface-inoculated shrimp, the die-off rate of the organisms increased. In the shrimp-and-sauce samples few cells of the organisms remained after 48 h storage, but, in the seafood sauce alone, the die-off of the organisms was complete at 6 h.
[3 tables, 19 references] FTP

0.6 (0.32)(9.6)

Protein Enrichment of Bread and Baked Products," by J. H. Hulse. This chapter covers the kinds of proteins that may be used such as egg, milk, legume, oilseed, single cell, synthetic amino acids, and less conventional proteins. Chapter V, "Legume Foods," by Ricardo Bressani and Luiz G. Elias. The subjects in this chapter include production, consumption, composition, nutrition, storage, and protein extraction of these foods. Chapter VI, "New Approaches to the Marketing of Red Meats," by F. E. Deatherage. This chapter covers all the major aspects of the meat industry in addition to future trends and Government regulations. Chapter VII, "New Approaches to Marketing Poultry Products," by A. W. Brant. This chapter is composed of descriptions of the poultry industry. Chapter VIII, "Meat Analogs," by F. E. Horan. This chapter covers the commercial, nutritional, and marketing aspects of vegetable proteins converted into meatlike products. Chapter IX, "New Protein Food Technologies in Japan," by Tokuji Watanabe, Hideo Ebine, and Minoru Okada. This chapter covers the production of foods from soy beans and other grains such as "tofu" and "miso," textured and hydrolyzed vegetable proteins, the fish-containing products kamaboko and fish sausage, and other enzyme applications. Chapter X, "Regulatory Aspects of New Protein Foods," by Peter Barton Hutt. This chapter covers Government regulation of formulation, labeling, advertising, and quality control of new protein foods. The book also contains, the affiliations and addresses of the authors, a list of references after each chapter, an author index, and a subject index. SW

0.4 (7.9)

The first standards, published in 1957, were on the breeding, care, and management of laboratory mice. Other standards deal with rats, Syrian hamsters, guinea pigs, nonhuman primates, rabbits, dogs, cats, chickens, Coturnix, and rodents. Guidelines pertaining to fish, amphibians, and ruminants are in press. Additional guidelines are being prepared for the care, management, and breeding of cats and birds and for the long-term holding of laboratory rodents. FTP

0.6 GRAPESEED OIL: A RICH SOURCE OF LINOLEIC ACID
(4.91)

Kinsella, J. E. (Dept. of Food Science, Cornell University, Ithaca, NY 14850)
Food Technology 28, No. 5, 58-60 (May 1974)

Grapeseeds are a significant component of the solid waste from wine manufacture; they may make up about 3%-5% of the weight of the grapes. Grapeseeds contain about 10% moisture, 9%-12% hexane extractable fat, and 8%-12% protein. Assuming an average yield of 10% fat, the grapeseed from grapes used in making wine, grape-juice, and jelly would provide about 10 million pounds of oil annually. In the production of oil, the grapeseeds are first recovered from the press residues (stems, pulp, and seeds) by a process that invludes washing, draining, threshing, and sieving. The grapeseeds are then dried and the oil extracted. The oil can be extracted in a mechanical press or by solvent treatment of the comminuted and/or flaked grapeseeds by conventional means. The crude grapeseed oil can then be refined by regular commercial processes involving degumming, bleaching, and deodorizing. Also, the refined oil may be winterized.

Grapeseed oil is clear with a yellowish tinge. It has a low viscosity and melts at -11° C. The fresh oil has a pleasant flavor, and the tocopherol content makes the oil resistant to oxidative deterioration.

Grapeseed oils show a fairly constant fatty acid content. The linoleic acid (18:2) content runs about 70%. The linolenic acid (18:3) content is quite low, about 0.5%. The low linolenic acid content and the pleasant flavor of grapeseed oil make it a nutritionally desirable salad oil. Grapeseed oil has been used as a frying oil, and it is stable. Furthermore, the safety of grapeseed oil has been well established.
[4 tables, 20 references] FTP

0.4 THE EFFECT OF pH ON DIMETHYLNITROSAMINE FORMATION
(0.39) IN HUMAN GASTRIC JUICE

Lane, R. P., and M. E. Bailey (Univ. of Missouri, Columbia, MO 65201)
Food and Cosmetic Toxicology 11, No. 5, 851-854 (1973)
Food Science and Technology Abstracts 6, No. 2, 18, Abstract No. 2C73 (Feb. 1974)

Solutions containing 200 p/m nitrite and 200 p/m dimethylamine were reacted with equal volumes of human gastric juice at pH 1.7, 2.5, 3.5 or 4.5 for 1 h. The reaction mixtures were then extracted and analyzed for dimethylnitrosamine. The results indicate that the optimum pH for nitrosation of dimethylamine in human gastric juice is about 2.5. SW

0.6 (0.38) EINFLUSS VON NITRIT UND VON MILDER WÄRMEBEHANDLUNG AUF DIE HEMMUNG AUTOLYTISCHER ENZYME IN LAMMFLEISCH UND IM MUSKELGEWEBE DES SÜSSERWASSERFISHES TILAPIA MOSSAMBICA
[EFFECT OF NITRITE AND MILD HEAT TREATMENT ON THE INHIBITION OF AUTOLYTIC ENZYMES IN LAMB AND IN MUSCLE TISSUE OF THE FRESH WATER FISH TILAPIA MOSSAMBICA]

Warrier, S. B. K., V. Nonjoor, P. L. Sawant, M. G. Hirlekar, and U. S. Kumta (Biochem. & Food Tech. Div., Bhabha Atomic Res. Centre, Trombay, Bombay 85, India)
Fleischwirtschaft 53, No. 7, 980-982 (1973) [In German; English and French summaries]
Food Science and Technology Abstracts 6, No. 1, 36, Abstract No. 1G15 (Jan. 1974)

The purpose of the study was to attempt a reduction in the concentration of nitrite used for preservation of muscle tissue and the possible development of less toxic substitutes. The hydrolytic enzymes aryl sulfatase (ARS), cathepsin (C), and ß-glucuronidase (GRD) were used as marker enzymes in studying the inhibition of autolysis by addition of nitrite combined with mild heating.

After homogenates of Tilapia muscle were heated for 2 h at 37°, 50°, and 60° C, no inhibition of ARS was observed; at 60° C there was about a 40% inhibition of GRD and a 60% inhibition of C. Heating at 37° C combined with a concentration of 1 or 2 × $10^{-5}$ M nitrite caused 70% inhibition of ARS, 10% of GRD, and 45% of C; the same concentration of nitrite combined with heating at 50° C inhibited 80% of ARS, 25% of GRD, and 40% of C; the same concentration of nitrite combined with heating at 60° C caused 85% inhibition of ARS, 60% of GRD, and 80-100% inhibition



0.7 (9.19) REVERSAL OF SELENIUM TOXICITY IN CHICKS BY MERCURY, COPPER, AND CADMIUM

Hill, C. H. (Dearstyne Avian Health Center, Dept. of Poultry Science, North Carolina State University, Raleigh, NC 27607)
Journal of Nutrition 104, No. 5, 593-598 (May 1974)

The toxic effects of selenium, fed as selenium dioxide, to chicks as measured by growth retardation and mortality could be partially alleviated by the inclusion of mercuric chloride, cupric sulfate, or cadmium sulfate in the diet. The reaction products formed between selenium and the other inorganic compounds were synthesized and fed to chicks and found to be less toxic than an equivalent amount of selenium fed as selenium doixide. Selenium toxicity was also counteracted by the inclusion of phenylmercuricacetate in the diet. Phenylmercuricacetate fed at a level to supply 50 ppm mercury was itself toxic as indicated by reduction in growth, and the toxicity could be partially alleviated by the inclusion of diphenylselenium in the diet. The molar ratio of mercury to selenium for the most effective counteraction of selenium toxicity when the two elements were fed in the inorganic form was 1:1. On the other hand the most effective ratio for counteracting the toxicity of phenylmercuricacetate by diphenylselenium was 4:1 indicating that the mechanisms on which the interactions are based are different in the two instances.

Author's abstract



0.6 (0.7) STABILITY OF ASCORBATE IN BACON

Newmark, Harold L., Modest Osadca, Mercedes Araujo, Clifford N. Gerenz, and Elmer De Ritter (Product Development Dept., Hoffmann-La Roche Inc., Nutley, NJ 07110)
Food Technology 28, No. 5, 28, 30-31, 60 (May 1974)

Bacon seems to be one of the more persistent sources of nitrosamines. Nitrosamine formation can take place in vitro before consumption of bacon, or in vivo after eating bacon. However, it is known that sodium ascorbate can block the formation of nitrosamines from the reaction between sodium nitrite and susceptible amines. Thus, this study was carried out to determine the stability of sodium ascorbate in bacons processed and vacuum packed under commercial conditions with various levels of sodium ascorbate. Also, the effects of storage of the bacon (in both unopened and opened packages) in the freezer and the refrigerator, and of subsequent frying, on the stability of the ascorbate were determined.

Bacons were processed with target levels of 0, 500, 1,000, 1,500, and 2,000 p/m of sodium ascorbate. Samples of bacon were packaged in 1-lb vacuum packages. Intact sample packages and packages opened by cutting off one end of the packages were stored at 5° C.and at -20° C. Refrigerator storage was 4 weeks for opened packages and 8 weeks for unopened packages; freezer storage was for 24 weeks. Analyses were made on the bacon before and after frying initially and during periodic intervals of storage.

Retention of ascorbate during processing of the bacon was 58%, 71%, 66%, and 83% of the original levels of 500, 1,000, 1,500, and 2,000 p/m. Stability of the



0.9 (9.2)(9.7) TECHNOLOGY EXPORT AND NATIONAL GOALS

David, Edward E., Jr. (Gould Inc.)
Research Management 17, No. 1, 12-16 (Jan. 1974)

There is a profound and increasing demand for United States technology by foreign nations. The flow of technology is the key to their development, to their foreign trade balances, and to their national well-being. Civilian technology, too, is an increasing factor in world influence. Our government seems somewhat less aware of the power of civilian technology for shaping the world. Yet, in recent years, there has been a growing tendency in our government to look at technology transfer as an integral part of foreign affairs and foreign policy. It appears that technology, and to some degree science, are becoming preferred currencies of foreign dealings. In this paper the author reviews current technology transfers issues, and he outlines four general guidelines to follow in the development of a viable U.S. policy. The policy guidelines are as follows. First, historical U.S. policy has assumed that free trade, including technology transfer, is desirable. Secondly, technology that is exported should be adequately reimbursed by the recipients. Thirdly, there should be case-by-case consideration of technology transfer to avoid setting premature precedents with foreign nations. Finally, certain trade-offs should be considered, and these often may appear paradoxical.

Trade advantages, the author indicates, do not rest on a particular new technology or an innovation, but on a continuing flow of new technologies and resulting innovations. Innovations will be imitated, they will be improved upon,

0.6 (0.7)

and they will be made obsolete by still newer innovations. Thus, the advantages of any particular innovation tends to be very volatile. The author suggests that research directors have a particular responsibility to influence government, labor, and management toward continuing flow of innovation as the only sound policy for the United States to sustain its competitive edge. FTP

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0.6 TECHNOLOGICAL PROCESS OF FISH FILLET AND FISH CAKE PRODUCTION ABOARD SHIPS
(2.118)

Dodonov, E. K. (Kamchatskoe Upravlenie Okeanrybflota, U.S.S.R.)
Rybnoe Khozyaistvo No. 2, 63-64 (1973) [In Russian]
Food Science and Technology Abstracts 6, No. 2, 173, Abstract No. 2R65 (Feb. 1974)

A description of a method for the manufacture of fish fillets and fish cakes at sea is given. Fish pieces 25-65 mm thick are produced. The advantages of the process include improved yield, and the potential for simultaneous production of three different products. SW

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0.6 FISH-LIKE FLAVORS

Kyowa Hakko Kogyo Co., Ltd. (pat.)
Japanese Patent 73 42632
Food Technology 28, No. 5, 99 (May 1974)

Fish flavor is imparted to food materials by the addition of 6-mercaptopurine-9-β-D-ribonfuranosido-5'-pyrophosphate esters. FTP

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0.9 (9.2)(9.7)

ascorbate during storage of the bacon was good for both the unopened and opened packages. The losses of ascorbate in bacon stored in the freezer were about 1% per week. Storage losses of ascorbate in the unopened bacon samples were 8% per week and in the opened samples 11% per week. An average of 26% of the ascorbate was lost during the frying process.

The results indicate that sliced bacon should be stored in the freezer if it is to be stored for a long period, particularly if the packaged is opened. [4 figures, 2 tables, 24 references] FTP

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0.6 (0.38)

of C in the Tilapia muscle. A combination of heating and a concentration of 0.5 × $10^{-5}$M nitrite in lamb muscle caused 77% inhibition of GRD at 50° C. and of C at 60° C. The combination of nitrite and heating were more effective than either alone in inhibiting the enzymes. Substitutes for nitrite must inhibit autolysis and bacterial growth in addition to improving color. SW

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0.4 (0.5) MYCOBACTERIUM MARINUM (ATYPICAL ACID-FAST BACILLUS) INFECTIONS OF THE HAND

Williams, C. S., and D. C. Riordan (1538 Louisiana Ave., New Orleans, LA 70115)
J. Bone Joint Surg. 55A, No. 5, 1042-1050 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 2, 105, Abstract No. 4Q1494G (Feb. 1974)

Infections of the deeper structures of the hand caused by M. marinum are described which were histologically indistinguishable from tuberculosis. There were six cases observed in the report. The infection became worse with steroid therapy. Surgical débridement with appropriate drug therapy (ethambutol or rifampin) was the treatment of choice. The organism must be suspected and then cultured at 30°-32° C rather than the usual 37° C. SW

1.01 (9.17) [THE EXPLORATION OF MARINE FOOD RESOURCES] DIE ERSCHLIESSUNG MARINER NAHRUNGSQUELLEN

Hempel, G. (Univ. Kiel, Inst. Meereskd., 23 Kiel, Düsternbrooker Weg 22, German Federal Republic)
Meerestechnik 4, No. 4, 170-174 (1973)
Aquatic Sciences + Fisheries Abstracts 4, No. 2, 145, Abstract No. 4Q1678M (Feb. 1974)

World fisheries are currently in a transition period. Tradiational fisheries shrink or collapse as the Norwegian and Icelandic herring fishery and the Peruvian anchovy fishery. The transition from exploitation to management of the resources is characterized by the assignment of catching quotas in international fishing agreements and the tendency to restrict fishing expenditure. Simultaneously the coastal countries demand extension of their fishing zones in anticipation of a new conference on maritime laws. In the Antarctic area, the Soviet fleet is developing a rewarding fishery, and estimates of the stocks of cuttlefish and plankton crabs suggest rich harvests on the high seas when appropriate catching methods are developed. The article also covers: the tasks of fishery research resulting from the transition in the fisheries, a survey of the fishing stocks using new methods in part, and the discovery and exploitation of oceanic stocks. SW



1.9 (1.0115) ELVERS IN MAINE. TECHNIQUES OF LOCATING, CATCHING AND HOLDING

Sheldor., William W.
Dept. of Marine Resources, State of Maine, Augusta, Me. (Apr. 1974), 25 pp.

The purpose of this study was to provide information on the elver run in the State of Maine and to develop techniques for the live capture, holding, and transport of the fish. The elver is a young eel. The fertilized eggs of the American eel first develop into surface-dwelling leptocephali (they are like transparent ribbons, shaped like willow tree leaves, with small pointed heads and long teeth). These leptocephali are carried towards the coast of North America, and about one year after hatching (2½-3½ inches in length) they arrive at the edge of the continental shelf. In December or January metamorphasis takes place during which they are transformed to the glass eel stage (it looks like a small eel but is completely lacking in pigment). As the glass eels approach the coast of North America pigmentation develops, and the eels are called elvers. The elvers invade eastern Maine streams and rivers in the spring; some of the eels are still in the glass eel stage (without pigment). The run is variable, but in 1971 and 1972 it started in mid-May and continued to mid-June. The elvers usually migrate upstream during the nighttime.

Various methods for the capture of elvers are described such as use of a modified Japanese elver net, trapping, and dip netting. Small quantities of elvers (less than 10 lb) can be transported for short distances in a wooden box 2 ft by 2 ft and 10 in high. They should be wet but not covered with water--elvers have the ability to take three-fifths of all required oxygen through their



1.8 (9.12)(9.2) (9.6) CRUSTACEANS

Schmitt, W. L.
Published by David & Charles, Newton Abbot, Devon, United Kingdom (July 1973), 204 pp. £3.50.
Aquatic Sciences & Fisheries Abstracts 4, No. 2, 47, Abstract No. 4Q1213G (Feb. 1974)

Crustaceans are found in habitats from deserts to glaciers. This book gives explanations of their ecology, biology, and their significance in the history and economy of man. There are chapters on body organization and taxonomy. Other chapters deal with behavior and habitats, communication, and light and color in crustaceans. Their use as human food is described with emphasis on the fisheries of North America. The uses of crustaceans in medicine are described; there are cures for malaria, asthma, eye infections, deafness, fever, and diarrhea. The final chapter covers the pests in the family of crustaceans including those that infest animals and man, predators on oysters, wood borers, and barnacles (hull fouling organisms). A systematic index and a subject index is included. SW



1.953 (9.17) THE WHALE CONTROVERSY: UNITED STATES VS. JAPAN

[various authors]
Marine Technology Society Journal 8, No. 3, 3-14 (Mar. 1974)

The points of view of the various participants in the controversy over conservation of whales are presented. The case for Japan is excerpted from a pamphlet of Japan Whaling Association [Are the whales really threatened with extinction? October 1973]. Japan's dependence on the sea and upon whales for protein needs is described. The need for ecological balance and maintenance of the whale stocks is also recognized by the Japanese. The official U.S. position on whaling was stated by Robert M. White, Administrator of National Oceanic and Atmospheric Administration and the U.S. Commissioner to the International Whaling Commission (IWC). The U.S. position is that since there is a worldwide sentiment for conserving the stocks of whales, a moratorium on hunting whales should be established; in addition, there are warning signs that the populations of the sei whale off South Africa, the fin whale off the coast of Canada, and the sperm whale in the Antarctic regions have been reduced to dangerously low levels. A conflicting position was presented by J. L. McHugh, professor of marine resources, State University of New York, Stony Brook, N.Y. He believes that the information on low whale population is exaggerated, and the concept of a moratorium on whale exploitation is idealistic and utopian. Furthermore, the quotas that have been set for the taking of whales do not have a valid basis in fact. Representatives of the Fund for Animals, in a statement of Oct. 16, 1973, accused the Japanese Government of whaling activities

1.9 [THE EEL] DER AAL
(9.6)

Tesch, F.-W.
Published by: Parey Verlog, Biol. Anst. Helgoland, 2 Hamburg 50, Palmaille 9, Federal Republic of Germany (1973), Price DM 78 [In German]
Aquatic Sciences & Fisheries Abstracts 4, No. 1, 82, Abstract No. 4Q410B (Jan. 1974)

This monograph gives comprehensive coverage of the entire genus Anguilla. The developmental stages and distribution of each species are covered with emphasis on comparative treatment. Information on anatomy, morphology, ecology, postlarval behavior, diseases, parasites, and injuries of the eel is summarized. There are several chapters on problems of fishery yields, fishing techniques, and marketing. Aquaculture of eels (maintenance, feeding, and breeding) is discussed including European and Japanese experience. SW

1.953 (9.17)

that threaten the extinction of several species; they also called for a boycott of Japanese imported products to force the Japanese Government to comply with conservation measures in whaling operations. In a press statement made by NOAA on Oct. 22, 1973, the Japanese and U.S.S.R. Governments were accused of ignoring the sense of the IWS in their whaling activities. Donald McKernan, Director of the Institute for Marine Studies of the University of Washington wrote in a publication of the Cold Spring Harbor Whaling Museum of New York that a compromise between the positions of the majority of the members of the IWC and the positions of the U.S.S.R. and Japan will be beneficial to the whale populations. By establishing realistic quotas for the whaling fleets to observe, the conservation of the whales may be achieved. SW

1.0112 THE SHORE FISHES OF HAWAII
(9.6)

Jordan, David Starr, and Barton Warren Evermann
Published by Charles E. Tuttle Company, Inc., Rutland, Vt. (1973), 392 pp. (Revised edition)

This classic study of Hawaiian shore fishes was first published as Bulletin of the United States Fish Commission for 1903 (vol. 23), Part I, The Shore Fishes, The Aquatic Resources of the Hawaiian Islands. The present edition is an abridgement into handbook form for the benefit of fishermen, scuba divers, fish fanciers, and nature lovers. All the essential information of the original edition has been retained, including the description of each fish with illustrations and plates. The fishes, listed as shore fishes of Hawaii, are found throughout the Pacific Ocean. The original work of the authors was aided by specimens found in the fish market of Honolulu in 1901 and 1902 and from information furnished by native Hawaiian fishermen. The original book was published in a limited edition, and original copies are now almost unavailable. SW

1.9 (1.01115)

body cells, directly from the air. Larger quantities (over 10 lb) of elvers must be transported in fiberglass tanks filled with water and equipped with an aeration device. Elvers may be held in boxes, 2 by 2 by 2 ft, where there is a good exchange of water.
[15 figures, 7 references] FTP

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1.93 PRESENT STATUS OF THE TURTLE FISHERY IN THE GULF OF MANNAR AND THE PALK BAY
(1.01512)

Jones, S., and A. B. Fernando (Univ. Coll., Dept. Zool., Trivandrum-1, India) In Proceedings of the Symposium on Living Resources of the Seas Around India, Cochin, Dec. 1968. Special Publication Central Marine Fisheries Research Institute, Cochin, India (1973), pp. 712-715.
Aquatic Sciences & Fisheries Abstracts 4, No. 2, 152, Abstract No. 4Q1707M (Feb. 1974)

The main commercial species caught in the Gulf of Mannar and Palk Bay is the green turtle, Chelonia mydas. Other species of turtles occur in the waters off the Indian coastline. An estimated 3,000 to 4,000 turtles are landed annually in the Gulf; in Palk Bay the number is estimated to about 1,000 annually. The possibilities of increasing the catches in the Gulf are discussed. SW

2.01 (0.5) HYDROGEN SULFIDE PRODUCTION BY PSEUDOMONAS PUTREFACIENS IN SHRIMP EXPERIMENTALLY PACKED IN NITROGEN

Lapin, R. M., and J. A. Koburger (Food Science Dept., University of Florida, Gainesville, FL 32611)
Applied Microbiology 27, No. 4, 666-670 (Apr. 1974)

When shrimp are packaged in a nitrogen atmosphere and stored at refrigerated temperature they develop off-odors not typical of those from normal spoilage. This study was carried out to characterize and determine the cause of these atypical spoilage odors. Fresh headed shrimp were packed in flasks or jars in an atmosphere of air or nitrogen and then the samples were stored at 5° C for 17 days. Bacterial analysis was made of the shrimp and chemical analysis was made of the headspace gas.

The results indicated that a large percentage of the microbial population present on the shrimp stored in nitrogen was capable of producing hydrogen sulfide, as compared to the microbial flora on the shrimp stored in air. The hydrogen sulfide producing bacteria P. putrefaciens was present at low levels on fresh shrimp, but the levels increased greatly by the 8th day of storage of the shrimp in the nitrogen atmosphere. It appears that cysteine and cystine were the probable substrates in shrimp utilized by the organism for the production of hydrogen sulfide.

In another test, shrimp were sterilized by irradiation, and then inoculated with P. putrefaciens and incubated in an atmosphere of nitrogen. These samples



2.05 (0.5) SURVIVAL STUDIES WITH SPORES OF CLOSTRIDIUM BOTULINUM TYPE E IN PASTEURIZED MEAT OF THE BLUE CRAB CALLINECTES SAPIDUS

Cockey, Ralph R., and Mahlon C. Tatro (Seafood Processing Laboratory, Natural Resources Institute, University of Maryland, Crisfield, MD 21817)
Applied Microbiology 27, No. 4, 629-633 (Apr. 1974)

Information is presented on type E botulinum toxin production in meat of the blue crab at temperatures of 40° F and above and the effects of pasteurization treatment (185° F for 1 min) upon various levels of C. botulinum type E spores in crab meat. Data are also included on the incidence of type E C. botulinum spores in bottom mud samples taken from areas where crabs are harvested commercially. Growth and toxin production of type E spores was determined in crab meat and in crabmeat homogenate. The inoculum was from $10^2$ to $10^6$ spores per test sample tube of the crab meat (10 g) or the crabmeat homogenate (10 ml). For the pasteurization tests, the inoculum ranged from $10^6$ to $10^8$ spores per 100 g of crab meat. The mud samples were taken from crab pot fishing areas of Chesapeake Bay near Crisfield, Md.

Type E C. botulinum spores were found in 21 of 24 bottom mud samples.

Sterilized crabmeat homogenates inocluated with as few as five type E spores per 10 g became toxic after 8 days' incubation at 50° F, after 2 days at 75° F, and after 1 day at 85° F. At storage temperatures of 50°, 75°, 85° F, growth of the organism was accompanied by gas production and a slightly sour odor. At 40° F incubation, growth and toxin production of type E spores required 55 days or



2.05 (0.5) EFFECT OF SODIUM NITRITE ON TOXIN PRODUCTION BY CLOSTRIDIUM BOTULINUM IN BACON

Christiansen, L. N. (Swift & Company, Research and Development Center, Oak Brook, IL 60521), R. B. Tompkin, A. B. Shaparis, T. V. Kueper, R. W. Johnston, D. A. Kautter, and O. J. Kolari
Applied Microbiology 27, No. 4, 733-737 (Apr. 1974)

This study is one part of a series undertaken cooperatively by the American Meat Institute, the U.S. Food and Drug Administration, and the U.S. Dept. of Agriculture to determine the minimum level of sodium nitrite required in bacon for botulinal protection and consumer acceptance. This particular paper is a report on the study of the degree to which nitrite retards or prevents growth of C. botulinum in bacon.

Pork bellies (for production of bacon) were formulated with 0, 30, 60, 120, 170, and 340 µg of nitrite per gram of tissue and were inoculated with C. botulinum spores by way of the curing pickle or after processing and slicing. The bellies were processed into bacon, and the bacon samples were stored at 7° and 27° C. The processed bacon was assayed for nitrite, nitrate, and botulinal toxin after intervals of storage of 7, 14, 28, 54, and 84 days. The desired inoculum levels were 0, and about 100 and 10,000 spores per gram of meat.

The level of nitrite decreased during processing and storage of the meat; the rate of decrease was more rapid at 27° than at 7° C. Nitrate was detected in the samples during their processing and storage at 7° and 27° C; the levels were related to the formulated nitrite levels. No toxin was detected in the bacon



2.1125 PURSE SEINE CABLE RING

Ferguson, Emery J. (3654 Kingsley, San Diego, Calif.) (pat.)
U.S. Patent 3,789,532
Official Gazette of the U.S. Patent Office 919, No. 1, 41 (Feb. 5, 1974)

These purse seine cable rings have recesses or corners on their inner surfaces to form a plurality of natural orientation points thus minimizing the tendency of the cable rings to orient in one position (thereby minimizing excessive wear along any one specific area). FTP

2.05 (0.5)

longer and inocula of $10^3$ spores or higher per 10 g of crabmeat homogenate. Also, at temperature of 40° F, gas production was not apparent and no off-odors were noted.

When inoculated packs of crab meat were pasteurized (1 min at 185° F), the type E spore levels were reduced from $10^8$ spores per 100 g to 6 or fewer spores per 100 g; the pasteurized crab meat remained nontoxic during 6 months of storage at 40° F. The authors conclude that the pasteurized meat of blue crab is a safe product provided that prescribed procedures for cooking, handling, pasteurizing, and storage are adhered to rigorously. FTP

[5 tables, 15 references]

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2.01 (0.5)

showed production of hydrogen sulfide and developed the characteristic atypical off-odors. FTP

[4 figures, 1 table, 20 references]

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2.1128 COLLAPSIBLE TRAP FOR CRABS AND THE LIKE

Olsen, Robert J.; assignor to Northwest Wire Works, Inc., Seattle, Wash. (pat.)
U.S. Patent 3,795,073
Official Gazette of the U.S. Patent Office 920, No. 1, 36 (Mar. 5, 1974)

The sides of this rectangular wire trap are hinged so that the trap may be collapsed when not in use. A framed opening is provided in each side for receiving a removable rigid wire tunnel. FTP

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2.113 ANTI-CORROSION COATINGS FOR EQUIPMENT FOR A FISH PROCESSING PLANT
(3.231) (3.61)
(3.336)

Minchenok, N. D., and D. M. Kramarenko (Nauchno-Issled. Inst. Lakokrasochnykh Pokrytii U.S.S.R.)
Rybono Khozyaistvo No. 2, 53-54 (1973) [In Russian]
Food Science and Technology Abstracts 5, No. 2, 172, Abstract No. 2R62 (Feb. 1974)

Protective coatings for fish processing equipment were tested in the laboratory and under operational conditions in the subtropics. The coatings were tested for resistance to 25% solutions of NaCl, 20% alkali solutions at 70° C, refined sunflower oil, and high temperatures. Recommendations are made for anticorrosion coatings for various kinds of equipment. SW

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2.113 CATHODIC PROTECTION OF MARINE OBJECTS

Vulcan, Robert
Chemical Abstracts 80, No. 18, 102968r (May 6, 1974)

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2.05 (0.5)

samples stored at 7° C throughout the test period of 84 days. At 27° C storage, the samples inoculated by way of the pickle (210 C. botulinum spores per gram before processing and 52 per gram after processing) became toxic if formulated with 120 µg of nitrite per gram of meat or less. No toxin was detected in bacon formulated with 170 or 340 µg of nitrite per gram of tissue under these same conditions. Toxin was found in bacon inoculated by way of the pickle with 19,000 spores per gram (4,300 per gram after processing) at all formulated nitrite levels, and in bacon samples inoculated after slicing. FTP

[1 figure, 7 tables, 5 references]

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2.111 [PRACTICAL EXPERIENCES WITH TRAWL NETS MADE FROM KNOTLESS NETTING] PRAKTISCHE ENFAHRUNGEN MIT SCHLEPPNETZEN (2.1121) AUS KNOTENLOSEM NETZUCH

Dahm, E., and H. von Seydlitz
Inf. Fischwirtsch. 20, Nos. 4/5, 123-126 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 1, 184, Abstract No. 40913M (Jan. 1974)

This article presents a review of the development and production of knotless netting with illustrations of the major principles of its function. Some experiences of the research vessel Walther Herwig in trial trawling with knotless netting are reported. A major fault of the netting is the tendency of the cut ends of the plaited yarn to unravel under pressure. This can be partially solved by the use of a thermo-cutter which welds together the surfaces of the free end. Other methods of joining and repairs are suggested. SW

2.113 (2.118) LABORATORY EXPERIMENTS ON CONTROL OF CORROSION OF COOLING EQUIPMENT CONTAINING BRINE

Erdesz, S., and J. Biro
Baromfüpar 20, No. 7, 302-306 (1973) [In Hungarian]
Food Science and Technology Abstracts 6, No. 2, 24, Abstract No. 2E56 (Feb. 1974)

Addition of various corrosion inhibitors to brine were compared on the basis of the literature and experimental results. Under the test conditions selected, the data indicate that sodium hexametaphosphate at a concentration of 0.5% in a cooling brine containing 33% $CaCl_2$ gave the best corrosion control. The concentration of inhibitor in the cooling brine decreased more rapidly in the presence of Fe than in the absence of Fe. SW



2.113 SOLUTIONS OF POLYETHYLENIMINE OR ITS HYDROPHILIC DERIVATIVE WITH A HYDROPHILIC ACRYLIC POLYMER FOR COATING BOATS BELOW THE FLOTATION LINE

Konstandt, Felix (Polymetrics International Inc.) (pat.)
Fr. Demande 2,165,881 (Sept. 14, 1973)
Chemical Abstracts 80, No. 16, 84767t (Apr. 22, 1974)



2.113 (2.114) CORROSION-RESISTANT FERROUS ALLOYS

Mendelson, Ralph A., Karl F. Staudhammer, and Roberto Valencia, Jr. (TRW Inc.) (pat.)
S. African 71 08,484 (Jan. 4, 1971)
Chemical Abstracts 80, No. 16, 86296n (Apr. 22, 1974)

2.113 (2.112) MOLLUSK REPELLENTS FOR FISHERY NETS

Hayashi, Yasuo, Kinji Iida, and Mitsuo Onozuka (Kureha Chemical Industry Co., Ltd.) (pat.)
Japan. Kokai 73 68,734 (Sept. 19, 1973)
Chemical Abstracts 80, No. 9, 44715t (Mar. 4, 1974)



2.113 ANTIFOULING COMPOSITION CONTAINING HALOETHANONE AROMATIC DERIVATIVES

Fujii, Masao, Shiro Shimatani, Teiji Yoshikawa, Isao Tokemoto, Tomiyoshi Kinami, and Yuzo Jitsu (Mitsui Shipbuilding and Engineering Co., Ltd.) (pat.)
Japan. Kokai 73 68,736 (Sept. 19, 1973)
Chemical Abstracts 80, No. 9, 44713r (Mar. 4, 1974)



2.143 (1.85)(2.1121) THE DEVELOPMENT OF AN ELECTRIFIED SHRIMP-TRAWL IN THE NETHERLANDS

Boonstra, G. P., and S. J. de Groot (Netherlands Institute for Fishery Investigations, IJmuiden, The Netherlands)
Journal du Conseil 35, No. 2, 165-170 (Feb. 1974)

Trials of electrified shrimp trawls were carried out to determine if fishing for shrimp could be possible within a 24-h period rather than in the dark hours; in addition, the electrified shrimp-trawl may reduce the destruction of immature flat fish by fishing with the ground rope off the bottom. Preliminary experiments were performed with an electrode array mounted on a 2×2 m frame. The distance between electrodes was 35 cm, and they were alternately positive and negative charged. The electrodes consisted of three strands of steel wire covered by polyamide material for strengthening and three strands of copper wire; the total diameter was 12 mm. The fishing speed was between 1.0-1.8 m per second; the trawling direction was with the tide; and the depths varied between 2.5-20 m. The time between shooting and hauling was 15 min. Three-meter beam trawls were used, one on each side of the vessel; however, one trawl, either port or starboard was electrified during the trawling runs for comparison.

The optimum pulse length in the experiments was established as being 0.2 ms; the pulse frequency was 5 Hz; and the voltage between the electrodes was 60 V. A pulse generator required for this type of trawling must have the following characteristics: resistance between the electrodes, 0.1 ohm; capacitive resistance

2.113 ANTIFOULING PAINT

Onodera, Nobuo, Mitsumasa Yamazaki, and Shosuke Imamura (Hodogaya Chemical Co., Ltd.) (pat.)
Japan. 73 09,451 (Mar. 24, 1973)
Chemical Abstracts 80, No. 12, 61134v (Mar. 25, 1974)

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2.143 (1.85) 2.1121)

(CR) time, 0.2 ms; discharge capacity, 2 mF; pulse frequency 5 Hz; voltage, 60 V; and power delivered to the electrodes, 18 W. Where to place the power supply for the pulse generator, either on board the vessel and fed by cable to the gear, or the pulse generator complete with power supply mounted on the gear, is under discussion.

The results of the trawling runs indicate that on electrified beam trawl catches about 116% more commercial-sized shrimp and 81% more undersized shrimp than the conventional beam trawl.
[4 figures, 2 tables, 10 references]

SW

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2.114 SEINE-HAULING BLOCK

(2.1125) Desmeret, Lawrence E. (3408 Redwood Ave., Bellingham, Wash.) (pat.)
U.S. Patent 3,797,806
Official Gazette of the U.S. Patent Office 920, No. 3, 789 (Mar. 19, 1974)

The seine floats are lodged in pockets formed between radial webs on the sheave of a seine-hauling block that serve as abutments to grip the floats for increasing the traction on a seine in hauling it.

FTP

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2.114 FISH LOADING METHOD

Puretic, Mario J. (259-6th Ave., N. Monte Cristo Isle, Tierra Verde, FL 33715) (pat.)
U.S. Patent 3,793,760
Official Gazette of the U.S. Patent Office 919, No. 4, 1106 (Feb. 26, 1974)

Fish are transferred from a net gathered alongside a fishing boat into the hold.

FTP

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2.113 LOW-ALLOY STEEL FOR WELDING CONSTRUCTION WITH
(2.117) CORROSION RESISTANCE IN SEA WATER SPLASH ZONE

Takamura, Akira, Kaname Arakawa, Kazuo Fujiwara, and Hiroaki Hirose (Kobe Steel, Ltd.) (pat.)
Japan. 73 10,691 (Apr. 6, 1973)
Chemical Abstracts 80, No. 8, 39978b (Feb. 25, 1974)

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2.113 PESTICIDAL PAINTS

Ueyama, Michio, Kazuyoshi Sasai, and Kuniyasu Maeda (Nippon Soda Co., Ltd.) (pat.)
Japan 73 14,415 (May 7, 1973)
Chemical Abstracts 80, No. 10, 49376t (Mar. 11, 1974)

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2.113 CORROSION OF HEAT EXCHANGERS IN SEA WATER SERVICE
(2.114)

Sakae, Yukio, and Kichiro Onimura (Mitsubishi Heavy Ind. Ltd., Tokyo, Japan)
Chemical Abstracts 80, No. 16, 85980u (Apr. 22, 1974)

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2.1472 REMOTELY STEERED TROLLER

Bonham, Ralph D. (381 W. Center, Pleasant Grove, VT 84062) (pat.)
U.S. Patent 3,793,761
Official Gazette of the U.S. Patent Office 919, No. 4, 1107 (Feb. 26, 1974)

This powered watercraft has a fishing pole mounted thereon. The craft is launched and is remotely controlled by a stationary operator. The craft is powered by rechargeable batteries that drive an electric motor which operates a propeller. FTP



2.3 PRODUCT DEVELOPMENT.
(3.234)(1.26) FROZEN CAPELIN PRODUCTS
(3.4)(3.5)

Bearns, Ron (Dept. of Food Technology, College of Fisheries, Navigation, Marine Engineering and Electronics)
Regional Report No. 4, Newfoundland Inshore Capelin Development Program, P.O. Box 5667, St. John's, Newfoundland, Canada (1973), 8 pp.

Methods are briefly described for the commercial preparation of frozen, breaded capelin, smoked capelin, and salted (corned) capelin.

Breaded capelin: The capelin are sorted to remove the female fish. The fish are knobbed or dressed, or prepared into butterfly fillets, usually by mechanical means. They are then cleaned and washed. The prepared fish may be frozen for later use, if desired. The dressed and cleaned capelin are drained to remove excess water and are dipped into a polyphosphate-salt-acetic acid solution for 3 min and then drained for 10 min. The drained fish are battered and breaded, individually quick frozen, and packaged. Also, the breaded capelin may be deep-fat fried at 350° F for 90 sec before freezing and packaging.

Smoked capelin: For smoking, the capelin may be whole, knobbed, dressed, fillets, or chunks. The washed fish are drained, and then they are immersed for 3 min in the following solution: 100 gal of water, 1 lb of potassium sorbate, 1 lb 4 oz of citric acid, 21 lb of salt, and 2½ gal of Annatto food coloring. The dipped fish are drained for 10 min.



2.15 PROCESSING AND PRODUCT DEVELOPMENT OF CANNED CAPELIN PRODUCTS
(1.26)(3.330)

Uebel, Wolfgang
1973 Newfoundland Inshore Capelin Development Program, Regional Report No. 5, Fisheries and Marine Service, Environment Canada, St. John's Newfoundland, Canada (n.d.), 20 pp.

This technical bulletin is an outline of the processing and procedures for canned capelin products that resulted from the development program. Since the Japanese market for prespawning female capelin is assured, the development program investigated the possibilities of converting male capelin into products for selected markets.

The capelin were harvested using Scottish ring-net and single vessel midwater trawl techniques off the coasts of Labrador and northern Newfoundland. The fish were loaded in bulk on the vessels and landed within 3 h of catching. Icing the fish with drainage during this time would be good practice, and boxing and icing the fish with drainage would result in prime quality material. The fish were unloaded by use of a dipnet or bucket. Discharge of the fish by pumping is not recommended. If the fish are to be held in storage for processing they should be packed iced in boxes. Rotary-drum and vibrating-bar type grading machines were used to separate the males from the females; both types damaged the fish. The fish may be cut open as dressed fish or filleted; they may be packaged and frozen for later processing.

The following canned products were developed: smoked with salt added, or soya oil added, or in tomato wine sauce, or in mustard sauce, or in soya oil and added



2.3 METHOD FOR PRODUCING DEEP-FROZEN FILLET BLOCKS

Gehlen, Hermann Walter, Karl Hartmann, and Gerhard Thieme; assignors to Eisenwerke Kaiserslautern G.m.b.H., Kaiserslautern/Pfalz, Germany (pat.)
U.S. Patent 3,777,503
Official Gazette of the U.S. Patent Office 917, No. 2, 463 (Dec. 11, 1973)

Fish fillet blocks are produced by deep-freezing the fillets and compressing them in the frozen condition into blocks of predetermined weight and shape. FTP

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2.3 DETERGENT COMPOSITION FOR CLEANING FISH AND SHELLFISH
(3.23)(3.33)

Katsumi, Mamoru, Masayuki Miyazaki (Kao Soap Co., Ltd.) (pat.)
Japan. 73 26,923 (Sept. 17, 1973)
Chemical Abstracts 80, No. 16, 84995r (Apr. 22, 1974)

2.15 (1.26)(3.330)

vegetables; steamed in mustard sauce, or with soya oil added, or in tomato wine sauce; butterfly fillets; and plain fillets. Aluminum snack cans of 3½-oz capacity were used. The raw material was fresh or frozen capelin. Frozen capelin required thawing under a cold water fog (not a spray). Packing capelin in oil or its own juice requires a brining before further processing. North American and European markets prefer 1.5%-2% salt concentrations in the finished product. To bring about this salt level three types of brining can be used: low salt--a 4% salt solution covers fish at a weight ratio of 1:1 with minimum retention time of ½ h; medium salt--a 6% salt solution covers the fish for 8 min leaving a residual salt level of 1.5%-1.8% in the product; and high salt concentration--22% by weight of salt solution requires only 2½-3 min retention time. These retention times relate to dressed capelin; retention times must be decreased for fillets. Taste panel tests of the brined fish indicated a rancid flavor. The off-flavor was eliminated by the addition of 0.6% acetic acid to the brines. Addition of polyphosphates to the brines did not improve the finished products.

Capelin can be smoked in a batch-type smokehouse or in a continuous working smoker. For canning purposes the fish should be hot-smoked between 80° and 100° C to ensure short smoking time, to coagulate the proteins, and to ensure fast drying. A smoking time of 34 min at 98° C, with an air velocity of 8 m (24 ft) per second, and a relative humidity of 40% resulted in an acceptable product.

If the capelin is packed in cans as a cooked product in sauces or oil it must be precooked before sealing the cans. Saturated steam at 80° C. for 12 min was used in the pilot runs. A description of packing the fish in cans is provided. Can fabrication and seaming is described in addition to specifying the sterilization procedure followed by cleaning, drying, and labeling the cans. The recipe for tomato wine sauce is also given. SW

2.1479 (1.953) ANCIENT AND CURRENT METHODS OF TAKING THE BOWHEAD WHALE

Durham, Floyd E. (Hancock Foundation, University of Southern California)
Alaska Sea Grant Report No. 73-9, University of Alaska, 707 A Street, Anchorage, AK 99501 (n.d.), 15 pp.

Primitive man used harpoons with lines and floats attached to fatigue the whale, and then he killed it with a lance. This technique continued in general use throughout the first half of the 19th century in the commercial harvest of the large, slow moving bowhead whales. It was used by the Eskimo in the western Arctic for more than 1,000 years. In the mid-1800's, the beginning of the Yankee commercial whaling, this Eskimo technique was altered by the additional use of explosive whale bombs for quickly and safely disposing of the harpooned, exhausted whale. By the beginning of the 20th century, when the whale stock had been depleted and the Yankee whalers had left the Arctic, the technique degenerated to the use of the bomb primarily. The technique resulted in considerably fewer recoveries and of waste.

The author concludes that the opportunity is ripe to relearn the old Yankee hunting skills and to reteach the Yankee technique of killing whales from open boats. Further, the opportunity is ripe to encourage conservation by harvesting what is actually needed, retrieving what is killed, and preserving the bowhead whale stocks for future generations.
[5 illustrations, 25 references] FTP

2.3 REDUCING THE SURFACE OIL CONTENT OF FRIED PRODUCTS

Nonaka, N., M. L. Weaver, and R. N. Sayre (Western Regional Research Center, ARS, U.S. Dept. of Agriculture, Berkeley, CA 94710)
Food Technology 28, No. 5, 50, 52-54, 65 (May 1974)

The surface oil content of French fried potatoes, and various potato and corn snacks, is reduced by contacting the fried product with liquid difluorodichloromethane (R-12). The excess surface oil and the oil enmeshed in the surface layers are removed. When the fried product is removed from the R-12, the fluorocarbon on the product quickly vaporizes; the solvent can be recovered by condensation. The oil accumulated in the R-12 can be recovered and reused. Recovery of the oil is achieved by distilling off the solvent or by precipitating the oil from the solvent by cooling the mixture with liquid nitrogen. The oil content of commercial French fried potatoes was reduced by 42% (from 4.3% to 2.5%) by this process.
[5 tables, 7 references] FTP

2.3 (3.234)(1.26)(3.4)(3.5)

The treated capelin are smoked on wire racks, or hung from racks, for 4 h at 80° F, using hickory or oak wood chips to generate the smoke. After this time the temperature of smoking is raised to 110° F and the process is continued until the fish reach a moisture content of 53%. The smoked fish are cooled, packed in suitable containers, and then quick frozen.

Salted capelin: Both female and male fish may be used. The fish are washed in running water, and then allowed to drain. The fish are salted in tanks or barrels using 30 lb of salt to 100 lb of capelin. The fish are allowed to cure for 4 h or longer depending upon the ambient temperature. The fish are then removed from the containers and are thoroughly washed and drained. The fish are placed on drying racks and are dried at a temperature not to exceed 80° F and relative humidity less than 70%. The capelin are dried to 35-38% moisture. The dried fish are then packaged.
[3 figures, 2 illustrations] FTP

2.43 (3.238)(3.338) THE METRIC QUESTION - EXPECT NEW PACKAGES, TRADE SHIFTS

Peters, J. W.
Food Product Development 7, No. 2, 48, 50 (1973)
Food Science and Technology Abstracts 6, No. 2, 26, Abstract No. 2F33 (Feb. 1974)

This article is a discussion of the impact on the United States if the metric system were adopted as the U.S. measuring standard. The requirements for new package standards is considered. In addition, adoption of the metric system by foreign countries and its impact on the U.S. consumer are outlined. SW



3.15 PHYSICAL AND CHEMICAL CHANGES IN IRRADIATED SALMON (ELEUTHERONESMA TETRADACTYLUM) AND BLACK POMFRET (PARASTROMATEOUS NIGER)

Madhavan, V. N., and U. S. Kumta (Biochem. & Food Tech. Div., Bhabha Atomic Res. Centre, Trombay, Bombay 85, India)
Acta Alimentaria Academiae Scientiarum Hungaricae 2, No. 4, 455-465 (1973)
Food Science and Technology Abstracts 6, No. 2, 173, Abstract No. 2R70 (Feb. 1974)

Dark muscles of Indian salmon and black pomfret contain more heme pigments and lipids than the white muscles and are more vulnerable to radiation-induced oxidative changes as expressed in terms of the free fatty acids and thiobarbituric acid reactive substances released. The dark muscle exhibited rancid odors, and the white muscle had burnt odors after radiation at 1.0 Mrad. Further studies on heme pigments indicated that the oxidation of oxymyoglobin to metmyoglobin occurs at 0.5 Mrad under aerobic conditions; anaerobic conditions with irradiation at the same dose causes a loss in the extractability of fibrillar proteins without altering the solubility of sarcoplasmic proteins. SW



3.15 (1.85)(1.014) [RADIATION PRESERVATION OF SHRIMPS] STRALINGSPASTEURISATIE VAN GARNALEN

Hovart, P., and W. Vyncke (Rijksstation voor Zeevisserij, Stadhuis, 4e Verdieping, B-8400 Ostend, Belgium)
EURISOTOP Office Information Booklet No. 75, Proceedings-21 (1973), 371 pp. Published by Eurisotop Office Information and Documentation Service, Rue de la Loi 200, B-1040 Brussels, Belguim. [In German, French, Dutch, and English]

An earlier Information Booklet (No. 70) contained technical information on shrimp preservation by irradiation. This present information booklet contains the report of a symposium held in Ostend, Belgium, 18-19 April 1972, also on the subject of shrimp preservation by irradiation. The papers presented to the symposium indicate that a series of scientific and technological operations must be set in motion before shrimp irradiation can be introduced as an economically viable method of preservation. The major topics discussed at the symposium are as follows.

The first session covered the economic and commercial aspects of the shrimp fishery and market in Europe. One paper was presented: "Economic Aspects of Shrimpfishery and Market" by P. Hovart. The second session was on the subject of technical aspects of shrimp preservation. The papers presented include: "A Survey of Shrimp Preservation Methods Other Than Radiation" by W. Vyncke; and "Some Technological Aspects of the Preservation of Shrimps Landed in the Netherlands" by H. Houwing. The third session dealt with the scientific and technical aspects of shrimp radiopasteurization. The papers given on this topic include: "Basic Data on the Technology of Gamma Irradiation in the Food Industry" by W. Schietecatte;



3.2494 [MICROBIOLOGICAL STANDARDS FOR DEEP-FROZEN FOODS] MIKROBIOLOGISCHE STANDARDS BEI TIEFGEFRORENEN LEBENSMITTELN.

Mohs, H.-J.
Mitteilungsblatt der GDCh-Fachgruppe Lebensmittelchemie und Gerichtliche Chemie 27, No. 8, 213-216 (1973) [In German]
Food Science and Technology Abstracts 6, No. 1, 10, Abstract No. 1B5 (Jan. 1974)

The criteria for the bacterial content of deep-frozen foods are proposed as follows: salmonellae, not detectable in 25 g of product; coagulase-positive staphylococci, less than $10^2$ per gram; enterococci, less than $10^4$ per gram; fecal streptococci, less than $10^2$ per gram; and sulfite-reducing sporeformers, less than $10^3$ per gram. These criteria are based upon a review of the literature and discussions by specialist organizations. SW

3.15 (1.85)(1.014)

"Radiation Preservation of Shrimps and Other Cooked Crustaceans" by W. Vyncke; "An Application Oriented Study on the Feasibility of Radiation Pasteurization of Shrimps Landed in the Netherlands" by H. Houwing; "Prolongation of Storage Life of Peeled and Unpeeled Brown Shrimps (Crangon vulgaris Fabr.)" by D. Declerck and W. Vyncke; and "Influence of Gamma Irradiation on the Carotenoid Pigments in Brown Shrimps (Crangon vulgaris Fabr.)" by F. Snauwaert, P. Tobback, and E. Maes. The fourth session was about the economics and commercial profitability of radiation pasteurization of shrimp in comparison with other preservation methods. The papers given at this session include "Radiation Preservation of Shrimps" by R. M. Ulmann; and "Economic Aspects of Shrimp Irradiation" by P. Hovart. Session five was about the legal aspects of food irradiation. One Paper was presented: "Commercialization of Irradiated Food: Existing Legislation and the Commission's Proposals" by G. Boncompagni. The sixth session of the symposium was a round table discussion on the technological and industrial prospects of shrimp irradiation and possible actions to be taken. Each paper presented is illustrated and provided with a bibliography. SW

3.30 (3.39) HEAT AND pH EFFECT ON MICROORGANISMS CAUSING SPOILAGE OF CANNED FOODS

Mazokhina, N. N., L. P. Naidenova, L. I. Rozenova, and T. V. Dashevskaya (All-Union Res. Inst. of Canning and Vegetable Drying Ind., 103030 Moscow A-30, Novoslobodskaya 7, U.S.S.R.)
Acta Alimentaria Academiae Scientiarum Hungaricae 2, No. 4, 385-391 (1973) [In English]
Food Science and Technology Abstracts 6, No. 2, 9, Abstract No. 2B17 (Feb. 1974)

This paper deals with the correlation of thermoresistance of bacterial spores in canned food and the pH of the food. Relative to Bacillus stearothermophilus strain 80 and Clostridium sporogenes 25, the correlation can be expressed as an equation of a straight line. In differentiating spore populations of heated C. pasteurianum 148, containing thermolabile and thermostable spores, the thermal resistance of thermolabile spores is independent of pH and that of thermostable spores is pH dependent. In experiments with C. botulinum the character of the spore survival curve varied with the pH of the food. At pH 5.0 the survival curve was expressed as a straight line in a semilogarithmic coordinate system. At pH 4.5, the survival curve was expressed as a curve; the curve reflected the probable distribution of spores according to their thermal resistance. SW

2.43 (3.238)(3.19) [STUDIES ON THE SURFACE FLORA OF EXTRUDED PLASTICS FOR FOOD PACKAGING] UNTERSUCHUNGEN ÜBER DIE OBERFLÄCHENKEIMZAHL EXTRUDIERTER FÜR DIE LEBENSMITTELVERPACKUNG

Voss, E., and B. Moltzen (Bundesanstalt fur Milchforschung,,Kiel, Hermannweigmann-Str. 1-27, Federal Republic of Germany)
Milchwissenschaft 28, No. 8, 479-486 (1973)
Food science and Technology Abstracts 6, No. 2, 30, Abstract No. 2F66 (Feb. 1974)

Results of the studies indicate that the surfaces of plastic packaging materials and containers were not always sterile even immediately after extrusion. Heating times of 3-7 min in the extruder, in which the final temperature reached 120°-220° C, did not destroy all the bacteria that were originally present in the plastic mix and failed to destroy all the added spores of Penicillium commune and Bacillus aureus. An extrusion temperature of 220° C was less lethal to microorganisms than extrusion at 200° C. Packaging materials and containers, it is concluded, need to be disinfected before coming in contact with foods. SW

3.15 RADURISATION PROCESS FOR INDIAN SALMON (ELEUTHERONESMA TETRADACTYLUM AND BLACK POMFRET (PARASTROMATEOUS NIGER)

Kumta, U. S., and V. N. Madhavan (Biochem. and Food Tech. Div., Bhabh Atomic Res. Centre, Trombay, Bombay 85, India)
Acta Alimentaria Academiae Scientiarum Hungaricae 2, No. 4, 467-475 (1973)
Food Science and Technology Abstracts 6, No. 2, 173 (Abstract No. 2R71 (Feb. 1974)

Indian salmon and black pomfret fillets were packaged under anaerobic conditions and radurized at 0.1 Mrad. The fillets were then stored at 0°-2° C to determine how much the shelf life was extended after radurization. There was not much change in natural freshness after an extension of shelf life of 20-25 days in comparison to unirradiated fillets which spoiled within 8-10 days. Fillets treated at higher doses of irradiation, 0.2 or 0.3 Mrad, and stored under aerobic conditions exhibited oxidative changes in the form of a rise in thiobarbituric acid reactive substances and the presence of rancid odors. Anaerobic packaging reduced these changes. Solubility of heme pigments in fillets exposed to 0.2 to 0.3 Mrad decreased by 50%-70% during storage in ice; this effect appeared to increase more during aerobic storage than in anaerobic storage. SW

3.9 (8.42)(9.19) HEAVY METAL CONCENTRATIONS IN MUSEUM FISH SPECIMENS: EFFECTS OF PRESERVATIVES AND TIME

Gibbs, Robert H., Jr. (Dept. of Vertebrate Zoology, Smithsonian Institution, Washington, DC 20560), E. Jarosewich, and Herbert L. Windom
Science 184, No. 4135, 475-477 (Apr. 27, 1974)

Little evidence is available to support the assumption that preserved museum specimens of fishes can provide reliable estimates of naturally occurring heavy metal concentrations. In this study, the researchers found that preservation can alter heavy metal concentrations in fish to a considerable extent, even enough to cast doubt on any study that is based on preserved material.

Eight species of lantern fish from a large frozen sample were analyzed for mercury, cadmium, copper, lead, zinc, and arsenic. Specimens of the two most abundant species in the sample (Hygophum hygomi and Ceratoscopelus warmingi) were used to determine the effects of preservatives and time. Specimens of each of these two species were fixed for about a week in formalin solution (about 4% formaldehyde). After fixation, two-thirds of the specimens were soaked in tap water, and half of each soaked specimens were placed in ethyl alcohol and the other half in isopropyl alcohol. After about 1 month's time from the initial fixation, the three preserved sample groups were analyzed for the six heavy metals.

The specimens of C. warmingi and H. hygomi had, within a month of being preserved, slightly to considerably different levels of five of the six heavy metals that were found in the frozen specimens from the same sample. All the preserved samples had considerably higher levels of copper and zinc, slightly higher cadmium levels, and lower mercury levels than did the frozen samples. No differences were



6.31 (1.013) KELP COMMUNITIES OF SOUTHERN SOUTH AMERICA

Dayton, Paul K. (Scripps Institution of Oceanography, University of California, San Diego, Calif.)
Antarctic Journal of the United States 9, No. 1, 22-23 (Jan.-Feb. 1974)

Sea otters in the northeastern Pacific feed on the herbivorous sea urchins which live in the kelp beds; in this manner the sea urchin population is controlled and the kelp beds are not overexploited. The author studied the relationships of sea otters, sea urchins, and kelp communities in the northeastern Pacific Ocean off the coast of southern California and compared them to the conditions he found off the coasts of southern South America. The beds of Macrocystis species of kelp were previously reported by the author to be overexploited by sea urchins off the Chilean coast. Off the coasts of the Isla de los Estados and nearby Tierra del Fuego large Macrocystis beds were seen. These were fringe beds ranging in width from 1/10 to 1 km and extending along the shores for many kilometers. The kelps off the coast of the Isla de los Estados were more similar to those off the coast of southern California than those of Chilean waters; the plants had large holdfasts with many stipes and similar spacing patterns. There were also small patches of sea urchins grazing on the beds. The Macrocystis distribution is often zoned between upper bands (up to 4 m in depth) and lower bands (below 25 m) of another brown alga Lessonia fuscescens. The Lessonia also appeared to be zoned below the intertidal Durvillea antarcticus. There were differences in densities of the sea urchin in the various bays of the island. Some of the larger kelp beds



6.190 (0.7) SOYBEAN MEAL DIETS SUPPLEMENTED WITH SULFATE, METHIONINE AND FISHERY PRODUCTS

Miller, David, Garfield N. Biddle, Paul E. Bauersfeld, Jr., and Susan L. Cuppett (Fishery Products Technology Laboratory, National Marine Fisheries Service, NOAA, U.S. Dept. of Commerce, College Park, MD 20740)
Poultry Science 53, No. 1, 226-234 (Jan. 1974)

The purpose of this study was to determine the effects of soybean diets supplemented with sulfate, methionine, and fishery products (menhaden fish meal and condensed menhaden fish solubles) on the growth of chicks. Five feeding tests were carried out; evaluations were made on the basis of rate of growth of chicks, feed efficiency, and certain blood parameters (hematocrit values, and total protein, albumin, and globulin contents). For the purposes of the experiments, data were obtained on the inorganic sulfate content of the meal (15 samples) and solubles (22 samples).

The sulfate content of the condensed menhaden fish solubles ranged from 1.17% to 4.91%, with an average of 3.13%; the sulfate content of the menhaden fish meals ranged from 0.02% to 0.55%, with an average of 0.25%.

When the chicks were fed corn-soy diets (20.5% or 24% protein) containing the supplements, only the fishery products induced significantly greater growth in the animals. When methionine or sulfate was added to soybean meal diets (containing 12% protein entirely from the soybean meal) significant growth responses in the chicks were obtained from methionine supplementation, but sulfate supplementation showed no significant growth response (in spite of the fact that the dietary content of sulfur-amino acids in the basal diet was 0.36%). This failure of



6.35 CARRAGEENANS. PART VII. POLYSACCHARIDES FROM EUCHEUMA SPINOSUM AND EUCHEUMA COTTONII. THE COVALENT STRUCTURE OF I-CARRAGEENAN

Anderson, N. S., T. C. S. Dolan, and D. A. Rees (Univ. Edinburgh, Chem. Dep., West Mains Road, Edinburgh EH9 3JJ, United Kingdom)
J. Chem. Soc., Lond., Perkin Trans. 1, No. 19, 2173-2176 (1973)
Aquatic Sciences & Fisheries Abstracts 4, No. 1, 35, Abstract No. 4Q177G (Jan. 1974)

Interpretation of data yielded by X-ray diffraction and optical rotation of I-carrageenan indicated the presence of a carrageenan double helix; this was confirmed by chemical methods. The I-carrageenan was isolated from the red seaweed E. spinosum; by methylation analysis, partial fragmentation, and other analytical procedures, the polysaccharide was shown to have a masked repeating structure in which D-galactose 4-sulfate and 3,6-anhydro-D-galactose 2-sulfate residues lie alternately in linear chains with formal replacement of about 1 in 10 anhydride residues by D-galactose 2,6-disulfate. This structure is converted to a true alternating copolymer by treatment with alkaline borohydride. A carrageenan from E. cottonii has residues that are similar to that of E. spinosum; however, it has no detectable 2-sulfate. Therefore, the carrageenan from E. cottonii corresponds more closely to an idealized kappa carrageenan than any other polysaccharide. SW

6.190 (0.7)

sodium or potassium sulfate supplements to produce any effect was not influenced by the addition of potassium or sodium bicarbonate to the diets. The chicks fed 12% protein diets supplemented with sulfate showed increased hematocrit values. Methionine supplementation served to increase plasma total protein, albumin, and globulin.
[6 tables, 8 references]

FTP

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6.32 ANTIBIOTICS FROM ALGAE. 8. PHLOROGLUCINOL FROM PHAEOPHYCEAE

Glombitza, K. W., H. U. Rosenerer, H. Vilter, and W. Rauwald (Pharmakognostisches Inst., Univ. Bonn, Bonn, Germany)
Chemical Abstracts 80, No. 13, 68382h (Apr. 1, 1974)

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6.35 (9.6) CHONDRUS CRISPUS

Harvey, M. J., and J. McLachlan (editors)
Nova Scotian Institute of Science Halifax, Nova Scotia, Canada (1973), xiii + 155 pp. Copies are obtainable from: The Librarian, Nova Scotian Institute of Science, c/o Science Library, Dalhousie University, Halifax, Nova Scotia, Canada.

Chondrus cripsus (Irish moss) is the most important seaweed of commerce in Canada and the Atlantic coast of North America. The articles in this collection were presented at the annual meeting of the Canadian Botanical Association and the Canadian Society of Plant Physiologists on June 19-21, 1972, at Dalhousie University, Halifax, Nova Scotia, Canada. The objective of publishing this collection is to bring together the available information on C. crispus so that it may serve as a guide and stimulant to new investigations. The topics in the collection are: "The Biology of Chondrus crispus Stackhouse: Systematics, Morphology and Life History," by A. R. A. Taylor and L. C.-M. Chen (pp. 1-21); "Cytology and Genetics of Chondrus crispus Stackhouse," by Louis A. Hanic (pp. 23-52); "Ecology of Chondrus crispus Stackhouse," by Arthur C. Mathieson, and Jeffrey S. Prince (pp. 53-79); "The Physiology and Biochemistry of Chondrus crispus Stackhouse" by R. G. Buggeln and J. S. Craigie (pp. 81-102); "Chemistry of Carrageenan," by W. Yaphe (pp. 103-110); "Ultrastructure and Histochemistry of Chondrus crispus Stackhouse" by E. M. Gordon and E. L. McCandless (pp. 111-133); and "Bibliography of Chondrus crispus Stackhouse," by Evelyn M. Campbell (pp. 135-155). Each chapter is provided with a bibliography in addition to the bibliographical section, and there are many illustrations.

SW

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3.9 (8.42)(9.19)

noted in the arsenic levels. The concentrations of lead were higher in all the preserved C. warmingi and in the H. hygomi in isopropyl alcohol, and they were lower in the H. hygomi in formaldehyde solution and ethyl alcohol. Apparently the three preservatives interact with the tissues of the fishes to give considerably different concentrations of some metals in differently preserved specimens. The cadmium, copper, and zinc in preserved specimens of C. warmingi and H. hygomi were least concentrated in formaldehyde solution and most concentrated in isopropyl alcohol. Also, in both species of fish, the lead level was the lowest in those fish preserved in isopropyl alcohol. It appears that the preservatives, themselves, are responsible for the differing metal levels in the fish tissues.

Until the effects of preservation are properly understood, the authors suggest, fluid-preserved museum specimens cannot be used for meaningful comparisons of metal concentrations.
[2 tables, 2 references]

FTP

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3.9 PLASTIC COMPOSITIONS FOR EMBEDDING BIOLOGICAL SPECIMENS

Dow Chemical Co. (pat.)
Fr. 2,169,502 (Oct. 12, 1973)
Chemical Abstracts 80, No. 16, 84260x (Apr. 22, 1974)

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6.31 (1.013)

observed off the Chilean coast in an earlier report had been eliminated by winter storms. The author suggests that winter storms and overgrazing by sea urchins make harvesting these small size beds too much of an economic risk. In comparing the northeastern Pacific kelp communities and southern South American communities, the latter have lower abundance and less species diversity; in addition, they are simpler in number and types of structural components such as algal canopies. There is also a relative absence of carnivores to control the sea urchins.
[3 references]

SW

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6.33 AGAR PRODUCTION

Matsuzaki, T. (pat.)
Japanese Patent 73 43627
Food Technology 28, No. 5, 100 (May 1974)

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Agar is extracted by immersing seaweed in an aqueous solution of a strong acid at 20° C, and then rinsing, neutralizing, and boiling the mixture. FTP

6.79 (1.89)(0.34) TYRIAN PURPLE: AN ANCIENT DYE, A MODERN PROBLEM

Baker, J. T. (James Cook University, North Queensland, Australia)
Endeavor 33, No. 118, 11-17 (Jan. 1974)

Tyrian purple, purple of the ancients, and royal purple are the names given to a dye originating in mollusks. The dye predates Roman times and was significant in the development and history of civilizations that existed on the shores of the Mediterranean Sea and in many other parts of the world. The species of most importance and referred to in ancient dyeing works are Murex brandaris, M. trunculus, M. erinaceus, and Purpura haemastoma, and P. lapillus. The first four were collected in the Bay of Naples, and the fifth was found in Cornwall, England. On the basis of shell mounds found near sites of ancient Mediterranean dye works, M. brandaris and M. trunculus were principally used; the first species lives on sandy or muddy bottoms at depths from 10 m to 150 m. All the other species used for dyes live in shallow water (0 to 15 m). The ancient historian Pliny described the method of catching Murex in wicker baskets. In modern times a species of Murex is currently being caught in mussel-baited baskets for the Venice fish markets. In addition, large quantities of the mollusks are being collected by trawlers with dredges near Venice and Naples. The mollusks are for human consumption, not for dyeing.

The source of the dye is a small, whitish 'vein' lying transversely under but not in contact with the shell. The glands of the larger snails were separated from the rest of the carcass, but smaller varieties were crushed whole, shell and



7.8 (8.8)(2.3) LEBENSMITTELRECHTLICHE BEURTEILUNG VON BRATFETTEN UND SEIDEFETTEN KRITERIEN FÜR DIE BEURTEILUNG DURCH DEN LEBENSMITTELCHEMIKER [EVALUATION OF FRYING FATS FROM THE VIEW-POINT OF FOOD REGULATIONS: CRITERIA FOR ASSESSMENT BY THE FOOD CHEMIST]

Wurziger, J. (Chemische-und Lebensmitteluntersuchungsanstalt in Hygienischen Institut der Freien und Hansestadt Hamburg, 2 Hamburg 36, Gorch-Fock-Wall 15-17, Germany)
Fette·Seifen·Anstrichmittel 76, No. 2, 52-57 (Feb. 1974) [In German; abstract in English]

The detection and assessment of decomposition of frying fats relative to food regulations are examined. The author discusses the relationships between flavor and acid value, saponification color number, alkali color number, and the content of oxidized fatty acids. To provide uniformity of evaluations, the content of oxidized fatty acids seems to be the preferred indicator of the quality of the frying fat.
[7 tables, 5 references] FTP



7.8 ANALYSIS OF TASTE TEST DATA BY MULTIVARIATE METHODS

Best, D. J. (CSIRO Div. of Mathematical Statistics, North Ryde, N.S.W., 2113, Australia)
Food Technology in Australia 26, No. 1, 20-22 (Jan. 1974)

In taste tests, assessments are made for separate qualities such as color, texture, flavor, and general acceptability in comparing food products. Differences between the products are then determined by the method of separate analysis of variants (ANOVA) for individual qualities described by W. J. Hoover, A. I. Nelson, and M. P. Steinberg [Fd. Technol. 9, 377 (1955)] and A. Yao, A. I. Nelson, and M. P. Steinberg [Fd. Technol. 10, 145 (1956)]. To make an overall conclusion based on the results, the separate qualities must be compounded in some subjective manner. In contrast, the technique of multivariate analysis of variants (MANOVA) deals with all the qualities jointly, uses the correlations between them, and gives an overall result in a single procedure. The MANOVA method is not new and has been used successfully in many fields of science; however, since it involves substantial calculation, the method was not widely applied until the availability of electronic data processing equipment became common. An example of the use of MANOVA is described in the article, and for comparison, the data used in the example were analyzed by the ANOVA method for the individual qualities assessed.

Acting as a consumer panel, 50 judges scored samples of three types of sultanas (grapes) on 5-point rating scales under standard taste test laboratory conditions. The data generated by the tests were subjected to the ANOVA method of analyses. Detailed instructions for such analyses are given by M. A. Amerine,



7.87 (4.5) A COULOMETRIC METHOD FOR THE DETERMINATION OF LOW PEROXIDE VALUES OF FATS AND OILS

Fiedler, Ulla (Dept. of Analytical Chemistry, Chemical Center, University of Lund, S-220 07 Lund 7, Sweden)
Journal of the American Oil Chemists' Society 51, No. 3, 101-103 (Mar. 1974)

Unsaturated lipids, exposed to air, are oxidized to produce peroxides and other degradation products. Such oxidative rancidity probably occurs by a free radical mechanism, and various organic peroxy compounds are produced. Inasmuch as the exact composition of the organic peroxides are often not known, the peroxide content of fats and oils is usually expressed as the peroxide value (PV). The PV is the ability of the oxidation products of the sample to liberate iodine from potassium iodide, and it is expressed in terms of milliequivalents of peroxide per 1,000 grams of sample.

The PV's obtained by iodometric methods are not absolute values, and they have no significance unless the analytical method used in their determination is given. The methods are empirical, and any variation in the procedure will give variations in the results. For reproducible results, the temperature, sample weight, amount of reagents, and time of contact must be controlled.

One of the standard methods for routine use is the AOCS (American Oil Chemists' Society) official method, which is an iodometric method using acetic acid-chloroform as a solvent. It is not satisfactory for low PV's because of difdifficulties in the titration end point determination.

In this paper, the author describes a sensitive coulometric method based on iodometry for the precise determination of PV. The reaction is carried out in an

7.8

R. M. Pangborn, and E. B. Roessler [Principles of Sensory Evaluation of Food, p. 451 ff. Academic Press, New York (1965)]. In the use of the ANOVA method, the value for general acceptability was obtained from data for that quality alone, but the results were highly correlated with the results of all the other qualities judged. Since the MANOVA method requires the analysis of the data for all qualities together, it gains an advantage from the accumulated effect of any common trends in the results for individual qualities besides using the correlations between them. Therefore, it is possible for the MANOVA method to demonstrate significant treatments not obtainable by the ANOVA method. In the panel tests of the sultanas using the MANOVA method, the results indicated that there was an overall difference between the three types. Color was not a significant factor, but texture, flavor, and general acceptability contributed to the overall result: two types of sultanas were not different from each other, but the third type was better than the other two. The complete calculations using the multivariate analysis of variants method are shown in the article.
[2 tables, 8 references] SW

7.87 (4.5)

electrochemical cell; the iodine produced is reduced at a rotating platinum electrode that is maintained at a constant potential. By means of electronic integration of the current a quantitative result is obtained whereby PV's ranging from 0.06 to 20 can be determined with appreciable precision in 9 to 15 min. This coulometric method is also suited for high PV's when improved precision is required.
[3 figures, 1 table, 6 references] FTP

6.79 (1.89)(0.34)

body being used in extracting the dye. In the ancient process of preparing the dye, to every 100 lb of snail material about 7 lb of salt were added, and the aqueous mixture was allowed to soak for 3 days and then boiled in a leaden vessel. The solid portion was diluted with water and moderately heated while the incidental flesh was skimmed off. About the tenth day a well-washed fleece was steeped in the liquid, while it was heated, until the color in the fleece met the required expectations of the dye workers. The Old Testament has many references to the colors blue, purple, and scarlet. Purple was mentioned in connection with Tyre and purple shellfish. The ancient Egyptians used purple dyes, and in Rome, the togas of the senators had a band of purple. By the fourth century A.D., the purple dye was very expensive and reserved for emperors and the gods. Since about 1685, when a minor dyeing industry in Ireland existed, the dye has been rarely used. The author also discusses the chemistry of the purple dye and its relationship to indigotin.
[15 figures, 23 references] SW

7.8 [THE TETRADE TEST AS A SUITABLE SENSORY METHOD. II. POSSIBILITIES FOR EVALUATION OF TEST PANEL MEMBERS] DER TETRADEN-TEST ALS AUSSAGEFÄHIGE SENSORISCHE METHODE. II. MÖGLICHKEITEN ZUR BEURTEILUNG VON SENSORISCHEN PRÜFPERSONEN

Römer, G., and E. Renner (Inst. Fur Tierzucht & Haustiergenetic, Justus Liebig Univ., Giessen, Federal Republic of Germany)
Zeitschrift für Lebensmittel-Untersuchung und-Forschung 152, No. 4, 219-223 (1973)
Food Science and Technology Abstracts 6, No. 2, 2, Abstract No. 2A52 (Feb. 1974)

A method for evaluating the performance of the individuals in a tetrade-test panel is described. The method, based upon each panelist's percentage of correct results, takes into account differences in the difficulty of individual test series. Twenty-one panelists were evaluated after about 2,500 tests were performed to determine each individual's taste threshholds for sucrose, NaCl, citric acid, and quinine. SW

8.8 (9.3) HACCP ANALYSIS IN QUALITY ASSURANCE

Curtis, J. E., and G. E. Huskey (Contech Research Laboratories, Greenville, Ill.)
Food Product Development 8, No. 3, 19, 24-25 (Apr. 1974)

Four objectives must be satisfied to assure quality in the food industry: consumer safety, compliance with regulations, acceptance by the consumer, and cost control. One of the prime considerations of quality assurance is food safety. To establish food safety, a Hazard Analysis and Critical Control Point (HACCP) evaluation must be carried out. The analysis must cover the food processing system from incoming raw materials to distribution of products. Each hazardous point is identified and controls must be established to eliminate it. To establish an HACCP system, three types of hazards must be identified and controlled; bacteria and molds such as Salmonella, Shigella, coagulase positive staphylococci, Clostridium perfringens, C. botulinum, Escherichia coli, and A. flavus; chemicals such as toxins (botulism, aflatoxin), heavy metals (mercury, lead), and PCB's and pesticide residues; and foreign matter such as stones, glass, and tramp metal. If any of the materials in these categories are present in foods in sufficient quantity to cause illness they become health hazards. Each step in the processing, packaging, and distribution of the product must be scrutinized to identify potential entry points of the hazardous materials to establish critical control points. The point in the production system and the method of sampling are determined by the type of product. The HACCP techniques, controlling potential entry areas for each hazard, prevent any hazards from advancing to the following processing step.



9. FAO TECHNICAL CONFERENCE ON FISHERY MANAGEMENT AND DEVELOPMENT

Stevenson, J. C. (editor)
Journal of the Fisheries Research Board of Canada 30, No. 12, Part 2, 1928-2537 (Dec. 1973)

This special issue of the journal contains the proceedings of a Technical Conference on Fishery Management and Development sponsored by the Food and Agriculture Organization (FAO) of the United Nations. The Conference was held in Vancouver, British Columbia, Canada, during Feb. 13-23, 1973. Some of the objectives of the Conference were (1) to centralize information on worldwide experience in fishery management and development, (2) to exchange scientific and economic information on fishery development and management, (3) to identify trends and opportunities in fishery development, (4) to determine where international cooperation in fishery development and management is possible and to provide guidelines for the development of future FAO fishery programs. These Conference proceedings contain 80 addresses, articles, and reports. Briefly summarized, the Conference recommendations included: (1) An integrated approach to fisheries development planning is recommended, taking into account scientific data and relevant economic and social factors. (2) Rational fisheries management requires adequate and timely statistical data related to the fisheries. (3) Management to protect fishery resources and maintain the yield is already overdue in many instances, but that such action should always be started early in the development of a fishery. (4) Successful management of traditional and new fisheries requires good scientific advice. (5) Effective measures should be taken to protect the stocks of fish where long-distance fleets might be in competition with coastal-based fishing vessels.



9.10 (9.3) STOCK COMPOSITION, GROWTH, MORTALITY, AND AVAILABILITY OF PACIFIC SAURY, COLOLABIS SAIRA, OF THE NORTHEASTERN PACIFIC OCEAN

Hughes, Steven E. (Northwest Fisheries Center, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. E., Seattle, WA 98112)
Fishery Bulletin 72, No. 1, 121-131 (Jan. 1974)

In 1969, an investigation of the distribution, availability, and biology of Pacific saury, Cololabis saira, in the northeastern Pacific Ocean was begun by our laboratory. This study was a direct result of a tenfold decrease in combined Japanese and Soviet landings of the species in the northwestern Pacific Ocean since 1958. Unusually high market demand created international interest in the unexploited stock in the eastern Pacific Ocean. The purpose of the paper is to provide initial information on stock composition, growth, and mortality and to supplement previous studies of distribution and abundance. Data were obtained during research vessel surveys, conducted primarily during August and September 1969 off the California coast, and during August and September 1970 and 1971 off the Washington and Oregon coasts.

During August-September 1969-71, data were obtained from more than 5,000 fish sampled from 19 individual schools captured between southern California and Vancouver Island, B.C. Length and age frequency distributions indicate fish grow to 340 mm in length during their 6-year lifespan. Larger fish apparently migrate farthest north and consequently age at full recruitment off Washington is III or IV, and II off Oregon. Spawning is extended over most of the year and the stock



9.11 (0.5) CONTRIBUTION À L'ÉCOLOGIE BACTÉRIENNE DE L'OCÉAN ATLANTIQUE NORD

De Rautlin de la Roy, Yves
Bulletin de l'Institut Océanographique Fondation Albert Ier, Prince de Monaco 71, No. 1422, 36 pp. (1973) [In French; English summary]

Between January 1962 and January 1966, 1,107 samples of water were taken in waters between Greenland and the west coast of Europe in the latitudes that include the British Isles and France, along the southwest coast of Europe, and the northwest coast of Africa. Of the samples taken, 728 were from depths to 3,000 m, and 379 from the surface waters. Quantitative and qualitative examinations were made on the samples. The results indicate that there is an irregular density of bacterial population in the vertical and horizontal distribution of samples. There is no regular decrease in density either from the coast (littoral waters were excluded from the study) to the open sea or from the surface to deeper waters. Instead, an irregular alternation, where the bacterial density was at times high, sometimes average, and at times low or zero, was observed. On the other hand, the observations indicated a stability of density in time for a given geographical area. This led the author to suggest that there is a stratification of sea masses inside the oceans.

The predominant groups in the bacterial population of the samples included 595 heterotroph strains, which confirms the heterogeneity of the bacterial population in the oceans. An irregularity in the distribution of the species and their enzymatic potentialities was suggested. The strict halophilic species formed only a small group of the bacteria isolated from the samples. The majority of the

9.

(6) International cooperation is essential to speed up the growth of the fishery industry and improve the economic growth of developing countries. (7) There is an urgent need to solve rapidly and efficiently the increasingly complex and multidisciplinary problems involved in the rational development and management of world fisheries. (8) Integrated multidisciplinary research is needed to provide a basis for comprehensive action relative to multiple uses of the aquatic environment that may adversely affect the survival and value of the fisheries. (9) Efforts should be made to increase production of fishery products by better utilization of incidental by-catches and discarded or neglected fish. (10) Development of aquaculture methods should be given high priority. (11) Every effort should be made to train personnel of developing nations so that these nations may participate fully in the worldwide program of fishery management and development. FTP

9.11 (0.5)

heterotrophic species were facultative halophiles (or euryhaline) with species of Achromobacter Acinetobacter, and Phytobacterium predominating. These genera are also usually isolated from terrestrial plants, soils, and freshwaters. Micrococcus, Vibrio, and Flavobacterium species were also present in large numbers.

The author suggests that the bacterial population differs according to the geographic areas of the ocean. The species of bacteria could constitute "biological tracers" corresponding to individual water masses inside the oceans. Quantitative and qualitative bacteriological analyses may be used to complement biological and physical oceanography to provide additional information in the study of water masses and deep currents.

[12 figures, 25 references] SW

8.8 (9.3)

The Food and Drug Administration (FDA), in its food plant inspection aproach, emphasizes HACCP analysis in addition to evaluating the quality control program concentrating on sanitation, adulteration of food, and compliance with regulations. The regulatory agencies, such as FDA, are attempting, through legislation, to set up a total system of mandatory government-regulated food plant quality assurance. This may not be necessary if the food industry can demonstrate its own capability to produce safe food products.

[4 figures, 10 references] SW

9.10 (9.3)

is believed homogeneous. First maturity appears to be reached during the second year. Numbers of males and females were nearly equal until age IV when females began to predominate. Length-weight regressions are presented by sex. Bertalanffy growth parameters were calculated: $K = 0.42$, $L_{\infty} = 342$ mm, and $t_0 = 0.72$ years. The total instantaneous mortality coefficient was estimated at 1.25-2.20.

Data on distribution and availability suggest a viable domestic fishery on this species is unlikely.

[7 figures, 3 tables, 28 references]

Author's introduction and abstract in part

9.11 (1.0145) EXPERIENCE OF THE HYDROMETEOROLOGICAL SERVICE OF THE U.S.S.R. IN PROVIDING SERVICES TO MARINERS AND FISHERIES IN NORTHERN WATERS AND THE ATLANTIC OCEAN

Terziev, F. S.
Application of Meteorology to Marine Interests. Marine Science Affairs Report No. 8, pp. 28-43 (English translation), pp. 44-54 (Russian) (1973). Secretariat of the World Meteorological Organization, Geneva, Switzerland.

This article was presented as a lecture at the sixth session of the Commission for Marine Meteorology in Tokyo, Japan, Oct. 9-21, 1972.

The fishing areas and shipping routes in northern waters and in the Atlantic Ocean are subject to severe weather conditions. High cyclonic activity causes frequent storms with hurricane force winds, severe ocean ice conditions, icing of ships, and fog. Such weather conditions affect the catch of fish, commercial shipping, and safety at sea. The main activities of the Murmansk Center of the (U.S.S.R.) Hydrometeorological Service are also affected by the severe weather conditions. Each year in northern waters, 80 or more instances are recorded of meteorological conditions which are particularly dangerous for the fishing fleet. The work of the Hydrometeorological Service is to provide forecasts and observations for these ocean areas. In 1950, trawling methods for herring were introduced in the Norwegian Sea. Trawling activities take place great distances from bases and are dependent on weather conditions, particularly conditions of wind, waves, ice conditions, fog, and temperature of the water. For these reasons, providing synoptic services of weather conditions directly to the ships at sea became



9.12 (9.16) AN ANNOTATED BIBLIOGRAPHY OF INTERSPECIFIC HYBRIDIZATION OF SALMONIDAE

Dangel, James R. (compiler) (College of Fisheries, University of Washington, Seattle, Wash.)
FAO Fisheries Circular No. 133, Food and Agriculture Organization of the United Nations, Rome, Italy (1973), 32 pp. (Distribution restricted)

This bibliography contains 327 annotated references to the literature, and to unpublished material, on hybridization of Salmonidae. The author attempted to include all the known reports available. The earliest reference in the bibliography is dated 1854. FTP



9.14 NUTRIENT REQUIREMENTS OF TROUT, SALMON, AND CATFISH

Anonymous
Report No. ISBN 0-309-02141-3, National Academy of Sciences, Printing and Publishing Office, 2101 Constitution Ave., Washington, DC 20418 (n.d.), v + 57 pp. Paperbound, $3.25.

This report contains a summary of the known nutrient requirements of trout, salmon, and catfish and a discussion of special considerations for diet formulation and storage. Tables of feed composition are included. The contents are as follows: Energy and metabolism in fish; Protein and amino acid requirements; Lipid requirements; Carbohydrates; Vitamins; Minerals; Excess, hypervitaminosis, and adventitious; Toxins; Symptoms of nutritional deficiency; Feed processing and storage; Composition of feeds; Tables; Appendix: typical test diets; Bibliography. FTP



9.15 (9.16) ON THE POSSIBLE TRANSFER OF TROUT PATHOGENIC VIRUSES BY GULLS

Eskildsen, U. K. (Danish Trout Research Station, Bröns, 6780 Skaerbaek, Denmark), and P. E. Vestergaard Jörgensen
Revista Italiana di Piscicoltura e Ittiopatologia 8, No. 4, 104-105 (1973) [Published by the Associazione Piscicoltori Italiani, Via Indipendenza 5, 31100 Treviso, Italy]

Experiments were performed to clarify whether two important trout pathogens that produce infectious pancreatic necrosis (IPN) and viral hemorrhagic septicemia (VHS) could be spread in the feces of gulls that had ingested infected fish. Six 3-week-old blackhead gulls (Larus ridibundus L.) were placed in individual cages in a room at temperatures of 20°-25° C. The gulls were not fed for 12 h, and then each was given 1.0 to 1.5 ml of VHS virus containing $2.7 \times 10^8$ plaque forming units (PFU) per milliliter. The virus inoculum was introduced into the esophagus of the gull through the mouth. The feces were collected from the bottom of the cages from day zero to day 6; the feces were suspended in nine parts of cell medium and frozen at -20° C until they were virologically examined on the seventh day. Three weeks later four of the same gulls were inoculated through the esophagus with 1.0-1.5 ml of IPN virus containing $2 \times 10^6$ PFU per ml. The feces were collected and suspended for 11 days during a 16-day period; the samples were kept at 4° C until they were virologically examined. The IPN virus was treated in this manner because of a report of the instability of some IPN virus strains due to freezing and thawing.

9.12 MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. CRUSTACEA: STOMATOPODA

Manning, Raymond B. (National Museum of Natural History, Smithsonian Institute, Washington, DC 20560)
NOAA Technical Report NMFS CIRC-387, National Marine Fisheries Service, NOAA, USDC, Seattle, WA 98105 (Feb. 1974), 6 pp. Single copies available from NOAA Publications Section, Rockville, MD 20852.

This report contains an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the stomatopod Crustacea of the inner continental shelf of the Northeastern United States. Four species are treated: Nannosquilla grayi (Chace), Squilla empusa Say, Heterosquilla armata (Smith), and Platysquilla enodis (Manning). The reports in this series on "Marine Flora and Fauna of the Northeastern United States" are timely in view of the growing emphasis on environmental work and the need for precise and complete identification of coastal organisms. Five other reports in this series have already been issued.
[10 figures, 3 references] FTP

9.11 (1.0145)

a necessity. With the introduction of synoptic services to Murmansk herring fleet in the North Atlantic no loss of fishing equipment occurred although, during a 4-month period, four hurricane force winds struck the area. The units of the service supplying synoptic information have been strengthened to include floating offices equipped with modern technical facilities for providing continual weather service. Operational units of the Hydrometeorological Service of the U.S.S.R. have adopted the method and are now providing weather information in all oceanic areas. The service offices maintain information on the deployment of the fishing fleet; this enables each office to give suitable forecasts, warnings, and advice for separate sea area squares. The opinions of the forecaster and oceanographer are decisive factors in determining schedules for towing ships, choice of routes, locations for shelter, type of towing, and the best times for operating. The article describes the staff of a synoptic unit, the types of ships and radio equipment required to accept the activities, and the daily routine of preparing synoptic forecasts and warnings. Education of ships' crews to acquaint them with the services is also described. Other services for forecasting sea surges and high-sea levels are also described. SW

9.15 (9.16)

The results of the virological examination of the feces indicates that the VHS virus appeared to be inactivated by passage through the gulls. Neutralization tests with rabbit antiserum to IPN virus confirmed that the virus was present in 6 of 41 samples of feces. The IPN positive samples were distributed as follows: one in feces from day zero; two from day 2; one from day 5; and two from day 7. The excretion of IPN virus by gulls indicates that they can effectively spread the virus in areas where they can feed on IPN infected trout in uncovered ponds. Other reports indicate that IPN virus can be isolated from the feces of chicken, owl, and mink which had been given the virus orally 24 h before. This result is important because it demonstrates the stability of the virus in warm-blooded animals.
[1 figure, 7 references] SW

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9.15 THE HELMINTH PARASITES OF EMBIOTOCID FISHES. III. A NEW SPECIES OF THE GENUS CUCULLANELLUS TORNQUIST, 1931 (NEMATODA: CUCULLANIDAE) FROM THE SHINER PERCH, CYMATOGASTER AGGREGATA GIBBONS

Walter, Gordon L., and Hisao P. Arai (Dept. of Biology, University of Calgary, Calgary, Alberta, Canada)
Journal of the Fisheries Research Board of Canada 31, No. 2, 205-209 (Feb. 1974)

Specimens of Cucullanellus kenaboe sp. nov., parasitic in the intestine of the shiner perch, are described by the author with illustrations.
[7 figures, 11 references] FTP

9.15 (9.16) AQUATIC ANIMAL HEALTH

Anonymous
Report No. ISBN 0-309-02142-1, National Academy of Sciences, Printing and Publishing Office, Washington, DC (n.d.), vi + 46 pp. Paperbound, $3.00.

Certain aspects of the status and future potential of aquatic animals to meet man's food and protein needs are reviewed. Then an examination is made of aquatic animal health and disease, identifying environmental and other manmade stresses that contribute to disease and kills in aquatic species. The final section of the report contains recommendations for research and educational programs to improve the nation's capabilities for dealing with aquatic health problems. The contents are: Present utilization of food of aquatic origin; Increased demand for food; Potential food from the aquatic environment; Aquatic animal health and disease; Laws and regulation for control of fish diseases; Manpower and facilities; and Summary and recommendations. FTP

9.16 (9.2) CALIFORNIA TROUT, SALMON, AND WARMWATER FISH PRODUCTION AND COSTS, 1972-73

Bruley, George K. (Inland Fisheries Branch, Dept. of Fish and Game, Sacramento, Calif.), and Emmitt McClendon (Dept. of Animal Sciences, University of California, Davis, Calif.)
Inland Fisheries Administrative Report No. 74-2, 38 pp. (Mar. 1974), State of California Dept. of Fish and Game, Sacramento, Calif.

This report is a summary of the activities of the fish hatcheries in the fiscal year 1972-73. In that time over 55 million fish weighing over 4 million pounds were planted. The species of fish produced are listed under three major classes: resident fish, anadromous fish, and warmwater fish. The resident fish include six species of trout, the Arctic grayling, and kokanee. The anadromous fish produced include king salmon, silver salmon, and steelhead trout. The warmwater fish produced include crappie, bluegill, catfish, the basses, threadfin shad, perch, and others. Catchable-size fish accounted for 77% of the total weight produced. Fingerling fish are those up to 1 oz each; subcatchable fish are from 1 oz each to six fish per pound in size; catchable fish are six fish per pound and larger; and brood fish averaged about 1 lb each. The total weight of resident fish produced in the year decreased by about 300 thousand pounds but the number of these fish increased by about 1.4 million fish. Subcatchable and catchable-sized fish production decreased both in weight and numbers. Rainbow trout accounted for 70% of the total weight of fish produced in the hatcheries. Almost 30 million anadromous fish were produced; of these, over 24 million were fingerlings.



9.16 COMPARISON OF PRODUCTION AND SURVIVAL OF CHANNEL CATFISH STOCKED ALONE AND IN COMBINATION WITH BLUE AND WHITE CATFISH

Green, O. L. (Bureau of Sport Fisheries and Wildlife, Southeastern Fish Cultural Laboratory, Marion AL 36756)
Progressive Fish-Culturist 35, No. 4, 225-226 (Oct. 1973)

This study involved a comparison of production and survival of channel catfish stocked alone and in combination with blue catfish and white catfish.

Three ponds were stocked with a combination of 180 channel catfish, 10 blue catfish, and 10 white catfish; three with 160 channel catfish, 20 blue catfish, and 20 white catfish; three with 100 channel catfish, 50 blue catfish, and 50 white catfish; and three ponds (control) were stocked with 200 channel catfish alone. Individual fish when stocked ranged from 34 to 38 per pound.

. . . [There was] no significant statistical difference in the four stocking combinations. Standing crop at time of harvest averaged 2,030 pounds per acre.

Individual channel catfish weighing 38 per pound increased to 1.1 pounds when stocked alone and 1.3 pounds when stocked with an equal number of blue and white catfish. Larger size of channel catfish in the combination stockings is directly attributable to the lower survival of the blue and white catfish. Size of the blue catfish at harvest appeared little affected by survival and averaged 0.8 pound. White catfish averaged 0.8 pound at harvest.



9.16 (1.69) MARINE FISH CULTURE IN BRITAIN. IX. GROWTH OF CULTURED PLAICE TO MARKETABLE SIZE IN THE LABORATORY

Bowers, A. B. (Marine Biological Station, University of Liverpool, Port Erin, Isle of Man, United Kingdom)
Journal du Conseil 35, No. 2, 149-157 (Feb. 1974)

Plaice were trawled from coastal waters of the Isle of Man and placed in outdoor seawater ponds. The fish produced fertile eggs and about 20,000 were hatched. The hatchlings were reared to the metamorphosis stage and 100 of these were selected and transferred to an indoor tank. In 3 years they grew to an average length and weight of 23.5 cm and 176 g, respectively. The fish were transferred to a larger tank where several females spawned but the eggs were unfertilized. Throughout their lives the fish were exposed to 12 h per day of fluorescent lighting. Thirty-eight of these fish were transferred to another tank where only natural light illuminated the area. The females in this group spawned; the eggs were removed and incubated at 7°-8° C. Most of the eggs hatched, and a few days later, the larvae were fed nauplii of Artemia salina. Of 2,000 eggs hatched, 954 fish survived and this group was observed for this report.

The fish were divided into three groups, one containing 50 fish, one with 250 fish, and the third with 654 fish. Over an 8-mo period, mortality in the tank stocked with 654 fish was 88%; in the 250-fish tank, 83%; and in the 50-fish tank, 66%. When the fish were 11 mo old they were weighed and measured. Fish 150 mm or more were separated from the other fish and placed in a tank; other fish 100-149 mm in length were placed in another tank; and the remaining fish were discarded.



9.16 (1.81) OYSTER GENETICS AND THE PROBABLE FUTURE ROLE OF GENETICS IN AQUACULTURE

Longwell, A. Crosby, and S. S. Stiles (National Marine Fishery Service, NOAA, Milford, CT 06460)
Malacological Review 6, No. 2, 151-177 (1973)

If artificial oyster culture is to become a truly viable industry, extra control of oyster strains by means of genetics (as in agriculture) is probably essential. The techniques for rearing edible oysters are already available. The oyster is regarded as a candidate for aquaculture. However, the true domestication of the oyster, with different strains suitable to intensive culture in hatcheries for profitable commercial operations, has not yet been achieved. Genetic modifications and domestication could ensure the potential contributions of the oyster to the world food supply. Domestication can be achieved by the application of genetic methods or, over a longer period, by trial and error breeding. Through the combined efforts of geneticists and commercial producers, domestication can be achieved. This article is a review of information on the genetics of the oyster Crassostrea virginica, including cytogenetics, inbreeding, selective breeding, hybridization, and induced mutations and irradiation. There are tables in the article on characteristics of mass spawned eggs, fertilization and fertilization failures, cleavage abnormalities, culture history of crosses, and culture profile of crosses. There also are diagrams showing the basic formula for selective breeding and for reciprocal recurrent selection.
[16 figures, 7 tables, 71 references] SW

9.16 (1.69)

The fish in the tanks were fed scallop meat and other fish foods, and weighed at intervals of 2 or 3 mo.

The results of the study indicate that the fish cultured at a density of 13 fish per square meter of tank area gave a yield of 11.6 kg of marketable plaice 21 mo after hatching for a food consumption of 56 kg. In addition, fish cultured in laboratory tanks grew faster than wild plaice in the sea and were heavier for their length.

[5 figures, 5 tables, 21 references] SW

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9.16 (1.9) THE GREY MULLET (MUGIL CEPHALUS L.) INDUCED BREEDING AND LARVAL REARING RESEARCH 1972-73. VOLUME II

Kuo, Ching-Ming (Principal investigator)
Report No. OI-73-128 (Sept. 1, 1973), v + 104 pp. Oceanic Institute, Oceanic Foundation, Waimanalo, HI 96795. Sponsored by the National Sea Grant Program, NOAA, Rockville, MD 20852.

The 1972-73 program on the induced breeding and larval rearing of the gray mullet had five objectives: (1) refine out-of-season spawning techniques; (2) total replacement of the purified salmon gonadotropin with mammal hormone to induce breeding; (3) increase larval survival to a commercial level by the use of better live diets, simplified and efficient rearing apparatus, and improved handling methods; (4) continuation of chemical and biochemical studies of natural maturation and oocyte hydration; and (5) test the feasibility of extracting and purifying gonadotropins from trash fish and fish waste with simplified procedures. The majority of these objectives have been realized and reports of the work are listed below. "A Procedural Guide To Induce Spawning" by C-M. Kuo, C. E. Nash, and Z. H. Shehadeh (pp. 1-15); "Induced Spawning of Captive Females by Injection of Human Chorionic Gonadotropin (HCG)" by C-M. Kuo, Z. H. Shehadeh, and C. E. Nash (pp. 17-21); "Operational Procedures for Rearing" by C. E. Nash, C-M. Kuo, and S. C. McConnell (pp. 23-34); "Brief Experimental Notes on Larval Survival" by C-M. Kuo, and B. H. Takenaka (pp. 37-45); "Preliminary Experimentation with Larval Feeds" by L. P. Raymond, G. A. Baxter, and W. Brandt (pp. 47-61); "The Effects of Temperature and Photoperiod on Ovarian Development" by C-M. Kuo, C. E. Nash, and Z. H. Shehadeh (pp. 63-84); and "Design of an Environmental Control Laboratory for Fish" by N. Bacon (pp. 85-97). There are 63 references in the bibliography, and each report is illustrated. SW

9.16 (9.2)

The cost of operating all hatcheries was about $4.2 million. The average cost to produce and plant all sizes of trout was $0.92 per pound. The cost to plant the trout was $0.14 per pound; thus the actual cost of trout production was $0.78 per pound. A 3-year comparison of trout production costs indicates that increased costs for labor, fish feed, and operating expenses caused a significant increase in the costs of production over that for the year before.

The report contains tables showing: species, size, weight, and number of all fish produced; the number, weight, and size of each species of fish produced by hatchery; and by region. Other tables list the cost of fish production by hatchery and region; detail costs of production and planting; costs of rearing different sizes of resident, anadromous, and warmwater fish in state financed hatcheries and hatcheries reimbursed by Federal, municipal, or private funds; estimated costs to produce each trout at each hatchery, the weight and cost of fish feeds consumed; and the species and numbers of fish recovered from strandings in receding waters.

[21 tables] SW

9.16

In the three species combinations, channel catfish accounted for a disproportionate share of the production when compared to the stocking ratio. Channel catfish present at 90, 80, and 50 percent of the populations accounted for 96, 90, and 68 percent, respectively, of total weight harvested.

Survival of channel catfish was essentially the same for the four stocking rates and averaged 95 percent. Survival of blue catfish was more variable and lower (82%). Percentage survival for white catfish, ranging from 10 to 90 percent, averaged 44 percent.

[1 table] Extracted; edited

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9.16 (0.8) INTENSIFIED FISH CULTURE COMBINING WATER RECONDITIONING WITH POLLUTION ABATEMENT

Liao, Paul B., and Ronald D. Mayo (Kramer, Chin & Mayo, Inc., 1917 First Ave., Seattle, WA 98101)
Aquaculture 3, No. 1, 61-85 (Feb. 1974)

This study involved the evaluation of water treatment systems for fish culture operations. The authors found that a properly designed water reconditioning reuse system, under the conditions described, can provide required pollution abatement and increase a hatchery's fish carrying capacity tenfold as compared to a single-pass system. They also discussed requirements for the removal of ammonia, nitrite, and solids.

[13 figures, 2 tables, 27 references] FTP

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9.16 (0.92) CONTROL OF DAPHNIA SPECIES BY COPPER SULFATE TREATMENT

Mitra, Eva, and S. C. Thakurata (Cent. Inland Fish. Res. Stn., Calcutta, India)
Chemical Abstracts 80, No. 15, 79122z (Apr. 15, 1974)

9.16 MASS CULTIVATION OF INVERTEBRATES. BIOLOGY AND METHODS

Ivleva, I. V.
Academy of Sciences of the USSR All-Union Hydrobiological Society, Moscow, U.S.S.R. (1969). Available from the U.S. Dept. of Commerce, National Technical Information Service, Springfield, AA 22151. Order No. TT 72-50055, vi + 148 pp., English translation.

The breeding and cultivation of commercial fish species requires an established and dependable food supply. One of the sources of food supply is the mass production of small invertebrates. Long experience in fish breeding has proved that the best results are obtained with live food objects, such as small invertebrates rather than artificial feeds. The culture of invertebrates was first carried out by amateurs who learned many decades ago how to cultivate natural food objects for the exotic fishes in their aquariums. The breeding of invertebrates for production purposes began at the end of the nineteenth century. Experiments have been conducted in the U.S.S.R. in the search for efficient ways to cultivate invertebrate animals at the same time finding acceptable artificial feeds for them. The most desired characteristics of the selected invertebrates are (1) fecund, (2) fast growing, (3) early maturing, (4) nonfastidious, and (5) capable of living in dense aggregations. The diet of cultivated fish must also be taken into account in seeking an acceptable natural food. The crucial role of cladoceran crustaceans (such as water fleas) in the life of young fish passing to the state of active feeding has increased efforts toward the cultivation of this group of invertebrates. The difficulty in the mass cultivation of invertebrates lies in the transition from



9.16 (9.15) BLOOD PROPERTIES OF CULTURED YELLOW TAIL, SERIOLA QUINQUERADIATA TEMMINCK AND SCHLEGEL. I. EFFECT OF DISEASE CAUSED BY ANCHOVY, ENGRAULIS JAPONICA HOUTTUYN, AS DIET

Nanba, Kenji, Heisuke Nakagawa, Shiro Murachi, Mitsu Kayama, and Tatsuo Nakamura (Dept. of Fisheries, Faculty of Fisheries and Animal Husbandry, Hiroshima University, Fukuyama, Japan)
Journal of the Faculty of Fisheries and Animal Husbandry Hiroshima University 12, No. 2, 89-99 (Dec. 1973)

Previous investigators have described a disease of cultured yellowtail fed anchovy over long periods. Some claim the disease results from the toxicity of the peroxides originating from the polyunsaturated acids in the anchovy, and others claim the disease is due to a thiamine deficiency caused by the presence of thiaminase in the feed. All the investigators have described the serious liver damage caused by the disease. In the present study, the researchers determined the effect of the disease, caused by prolonged feeding of anchovy, on the blood characteristics of the cultured yellowtail. Yearling yellowtail were fed for 50 days one of two diets; the first consisted of anchovy (test diet) and the second of sand lance (control diet).

The yellowtail fed the anchovy diet showed a loss of appetite, retarded growth, abnormal swimming patterns, change of color, and atrophy of the liver. The mortality of the anchovy-fed group after 50 days was about 50% and that of the sand lance-fed group was 5%. Hemoglobin content and hematocrit values of the



9.16 (1.11)(1.12) REPORT ON EXPERIMENTS ON THE DEVELOPMENT OF TUNA CULTURING TECHNIQUES (APRIL, 1970-MARCH, 1973)

Anonymous
S Series 8, Far Seas Fisheries Research Laboratory, Shimizu 424, Japan (Sept. 1973), 212 pp. [In Japanese; English summary]

This report deals with tuna rearing experiments carried out under a 3-year plan with Tokai and Kinki Universities and other fisheries experimental stations and coordinated by the Far Seas Fisheries Research Laboratory. There were two overall objectives in the program: develop rearing techniques for larvae and juveniles resulting from artificially fertilized eggs; and develop rearing techniques for young tunas caught at sea. In 1970, two mature yellowfin tuna were caught that produced 1.07 million ripe eggs that were successfully fertilized. The resulting larvae were reared for a maximum of 20 days. In 1971 and 1972 attempts to artificially fertilize tuna eggs from mature yellowfin tuna were unsuccessful. Frigate mackerel eggs were successfully fertilized and the resulting larvae lived for a maximum of 58 days. Experiments in transporting eggs and larvae were conducted. Fertilized eggs were transported by car, train, and ship from one experiment station to another without harmful results. Resulting larvae were handled in the same way. The larvae originating from various locations did not survive very long. Rearing experiments of young bluefin tuna were conducted in 1970. In August, 89 bluefin tuna were caught and reared; each weighed about 400 g and increased in weight to 2.9 kg by December. After that date, growth slowed down as water temperature dropped. The fish weighed 3.3 kg by March. Mortality was heavy at the beginning and there was a 25% survival by March. Other rearing experiments



9.16 OYSTER GROWING APPARATUS AND METHODS

Budge, William W. (Hillsborough, Calif.), and Malcolm Donald; assignors to Pacific Mariculture, Inc., Pigeon Point, Pescadero, Calif. (pat.)
U.S. Patent 3,779,209 (Dec. 18, 1973)

This apparatus is used for growing oysters in seawater. It consists of screens mounted in seawater so that they are above the bottom at all times and below the top surface of the water most of the time. The seed oysters are cemented to the screen in a predetermined pattern. FTP

9.16 (1.11)(1.12)

in 1972 were unsuccessful. In another location 88 fish taken in August-September were reared. There was a 50% mortality rate during the winter months. The bluefin tuna most suitable for successful rearing appear to be smaller than 1 kg and those captured before the time of low water temperatures (summer or early fall). In most areas, the catches at this time are small. The site for rearing the young bluefin tuna should be where winter temperatures do not fall below 15°-16° C; in addition, the amount of rainfall should not markedly change the salinity of the water. A stable supply of young fish is also important in the rearing of bluefin tuna. At least 1,000-2,000 young fish are required for a base stock.

Experiments were also conducted with tuna-related species: dogtooth tuna, bonito, and little tunny, skipjack tuna, and frigate mackerel. Low water temperatures seemed to be the prime deterrent to growth and survival in the winter season.

SW

9.16 FACTORS AFFECTING FEED CONVERSION RATIO IN FISH PONDS

Schroeder, Gerald L. (Fish Culture Research Station, Dor, Israel)
Bamidgeh 25, No. 4, 104-113 (Dec. 1973)

A group of 26 commercial fish ponds was studied to determine factors affecting the efficiency with which supplemental feed (sorghum and/or protein-enriched pellets) was utilized. Food was supplied to all ponds according to a standard formula widely used in Israel that takes into account standing stock, weight and type of fish in the pond. The ponds are arranged in a flow-through chain; residence time of the water in the individual ponds varied from less than one week to several months. Pond waters contained 1,900 to 2,700 ppm dissolved solids with 850 to 1,400 Cl. Concentrations of several chemicals found in the pond bottom soils decreased with increasing depth indicating that the chemicals do not enter the pond water from the pond bottom. Zooplankton concentration in pond water varied from 0.1 to 2.0 mg/l and were related to residence time of the water in the pond system. On similar exposure to light for 2 weeks all the pond waters produced, and sustained similar plankton concentrations.

A weak correlation between feed conversion ratio (FCR) and types of fish stocked in the pond was found. A strong correlation was found between FCR and zooplankton concentration in the range of 0.1 and 1.1 mg per liter pond water. In this range natural feed concentrations are the main factor governing the efficiency with which the supplemental feed is used by the fish. At higher zooplankton concentrations there may have been an excess of total food (natural plus supplementally) in the pond. No correlation existed for stocking density (range 1000 to 5000 kg fish per hectare) and FCR or for size of fish initially stocked and FCR, indicating that the feeding formula compensates for changes in these variables.
[4 figures, 5 references]

Author's abstract

9.16

transferring knowledge gained in the laboratory to large-scale production. The purpose of this publication is to introduce this important branch of applied biology not only to specialists but also to a wider circle of readers.

The book contains articles on cultivating Enchytraeus albidus (a worm), nematodes (roundworms), Branchiopoda (water fleas, fairy shrimps), Daphnia (a genus of the order Cladocera), and Chironomidae (nonbiting mosquitoes and midges). Each article contains information on gross morphology and habitats, locomotion, environmental factors, reproduction, growth and development, population factors, feeding, composition, respiration, and cultivation methods. Each article is followed by a bibliography partly of Russian origin and partly of English. There are many illustrations for identifying the organisms discussed and setups for cultivation.

SW

9.16 (9.15)

blood were about the same for both groups of yellowtail. Total plasma cholesterol of the anchovy-fed fish remained the same, while that of the control group increased. The plasma lipids of the anchovy-fed fish had lower levels of triglycerides and phospholipids and higher levels of wax esters than did the sand lance-fed yellowtail.
[3 figures, 1 illustration, 3 tables, 15 references]

FTP

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9.16 APPARATUS FOR GROWING CRUSTACEANS

Day, John J., and Paul S. Hirschman; assignors to Ocean Protein Corp., New York, N.Y. (pat.)
U.S. Patent 3,797,458
Official Gazette of the U.S. Patent Office 920, No. 3, 700 (Mar. 19, 1974)

The apparatus and method is used for the growth and maturation of crustaceans under optimum conditions during their post larval period.

FTP

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9.16 ANESTHETIC FOR FISH

Shimizu, Masamo, Yoshiyuki Takase, and Kaoru Kohno (Daiichi Pharmaceutical Co., Ltd.) (pat.)
Japan. 73 16,163
Chemical Abstracts 80, No. 17, 91409f (Apr. 29, 1974)

9.16 AMMONIA TOXICITY LEVELS AND NITRATE TOLERANCE OF CHANNEL CATFISH

Knepp, G. L. (Caterpillar Tractor Co., Peoria, IL 61611), and G. F. Arkin
Progressive Fish-Culturist 35, No. 4, 221-224 (Oct. 1973)

Growth of the catfish production industry in the Northern States of the United States has been slow because climatic conditions leave only about 6 months when pond temperatures are above 60° F--the temperature at which growth stops. Use of confinement systems wherein the temperature of the water can be controlled necessitates having a high ratio of pounds of fish to water volume to keep building costs low. With a high stocking rate, however, the water must be filtered to remove solids and nitrogeneous compounds, or there must be available a continuous source of freshwater. Fish excrete a relatively large amount of total nitrogen (ammonia, urea) in relation to their body weight. Because ammonia is toxic to fish, the efficiency of a biological filter in removing it from the water in a confinement system is important. In order that adequate biological filters can be designed, information on the acceptable level of ammonia and nitrate for growing channel catfish must be known. In this study, the authors determined the $LC_{50}$ and $LC_{100}$ ammonia concentrations for channel catfish, and the effect of rising nitrate levels on channel catfish and largemouth bass.

The results of this investigation indicate that for channel catfish (Ictalurus punctatus) the $LC_{100}$ value for total ammonia is 45.7 p/m (sd±6.0 p/m) and the $LC_{50}$ value is 37.5 p/m (sd±1.7 p/m). Observations of nitrate concentrations for channel catfish and largemouth bass (Micropterus salmoides) indicate tolerances as



9.17 (9.3) PROCEEDINGS OF THE WETLANDS MANAGEMENT SEMINAR

Anonymous
Regional Marine Resources Council of the Nassau-Suffolk Regional Planning Board, Hauppauge, New York (Sept. 15, 1972), 131 pp.

The purpose of the Wetlands Management Seminar was to present current research concepts and management tools involving wetlands to persons responsible for developing public policy decisions in the Nassau-Suffolk, New York, region. The seminar also provided an opportunity for the exchange of ideas for the planners and administrators responsible for managing our coastal resources. The subject areas covered were: Natural values of wetlands -- planning elements; Value of wetlands in their developed state; Ecological/biological and legal/economic state-of-the-art for wetlands management; Present guidelines for wetlands management at the (a) federal level, (b) state level, and (c) local level; and Research needs for wetlands; planning and management--(a) social/economic level, (b) ecological/biological level, (c) engineering/physical level, and (d) pollution aspects. FTP



9.17 (9.12) A SIMPLE ANALOG FOR TEACHING DEMOGRAPHIC CONCEPTS

Oster, G. F. (Dept. of Entomological Sciences, University of California, Berkeley, Calif.)
BioScience 24, No. 4, 1212-1213 (Apr. 1974)

A mechanical analog for recognizing age distribution concepts was developed. The equations governing the analog are based on the works of H. Von Foerster [The Kinetics of Cellular Proliferation (F. Stohlman, Jr., ed.), pp. 382-407. Grune and Stratton, New York, N.Y. (1959)] and H. L. Langhaar [J. Franklin Inst. 292, No. 3, 199-214 (1972)]. The mechanical analog conception is represented by a "leaky" conveyor belt moving constantly at 1 age unit per 1 time unit; that is, distance along the belt corresponds to age and the movement of the belt can be considered the aging process. Individuals in the population are represented by grains of sand on the belt. The total population in a unit of time equals the total amount of sand on the belt, and the length of the belt equals the maximum age attainable by individuals in the population. The shape of the population profile at any specified time depends upon two functions: the fertility and the mortality. The death rate is represented by a distribution of holes in the conveyor belt through which the sand leaks. As the sand particles move along the belt, the size of the holes and their distribution on the belt must be imagined to change in order to produce a death rate corresponding to any one place along the conveyor belt. New individuals entering the population can be conceived of as sand dropping on the belt from a hopper. The rate at which new individuals enter the system (fertility) depends upon the number of individuals in the



9.17 (9.2) TESTS FOR MORTALITY AND RECRUITMENT IN A K-SAMPLE TAG-RECAPTURE EXPERIMENT

Pollock, K. H., D. L. Solomon, and D. S. Robson (Biometrics Unit, Cornell University, Ithaca, NY 14850)
Biometrics 30, No. 1, 77-87 (Mar. 1974)

In tag-recapture experiments for estimation of the number of individuals in a population, a simplifying assumption is made that the population is closed (no recruitment, emigration, or death) during the sampling period. In some circumstances, the validity of such an assumption is not clear; therefore, a need exists for simple tests for mortality and recruitment, so that the most appropriate estimation procedure can be followed. The authors developed tests to distinguish between the following possibilities: (1) no mortality, no recruitment; (2) mortality, no recruitment; (3) no mortality, recruitment; and (4) mortality, recruitment. In a K-sample tag-recapture experiment, a population is randomly sampled K successive times. The untagged elements of a sample are serially tagged, and the serial number of each of the previously tagged elements is recorded. The entire sample is returned to the population. A series of equations is derived to test the combinations of mortality and recruitment and tables are presented which show the distributions of the results. A diagram is presented to summarize the application of the tests that were developed.
[1 figure, 4 tables, 7 references] SW

9.17 (9.12)

"breeding interval" on a certain length of the conveyor belt. Calculations of the number of individuals in the breeding interval are fed back to a valve on the hopper which correspondingly changes the rate of sand dropping onto the conveyor belt.

The concepts described in the article are also defined in accompanying mathematical equations and diagrams.

[2 figures, 4 references] SW

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9.17 CONDUIT STRUCTURE FOR MIGRATING FISH
(0.8)

Ralstenkka, John E. (1414 S.W. 12th Ave., Portland, Oreg.) (pat.)
U.S. Patent 3,772,891 (Nov. 20, 1973)

This conduit is closed from the atmosphere and provides a means by which migrating fish may circumvent a dam. Baffles are spaced within the conduit to develop eddy currents and thus provide resting zones for the migrating fish. FTP

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9.17 THE FUTURE MANAGEMENT OF THE OREGON COAST
(9.3)

Proceedings of a Symposium sponsored by the Ocean Resources Law Program, University of Oregon, October 27, 1972
Publication No. ORESU-W-74-001, Sea Grant Program, Oregon State University, Corvallis, OR 97331 (n.d.), 167 pp.

In 1971, the Oregon Legislature created the Oregon Coastal Conservation and Development Commission and charged it with the responsibility of developing a coordinated coastal zone management plan. The plan is to be submitted for consideration of the 1975 legislative session; it will serve as a basis for possible legislation. This Symposium was called to provide a forum where some of the major questions facing the Commission could be discussed. The various discussions and panel sessions considered the following subject areas: Legal background for coastal zone management; Zoning laws and the coastal zone; Importance of planning the Oregon coast; Environmental considerations of estuary management; Balancing the coastal zone interests; What level of government for the coastal zone; and The Oregon coastal economy needs of the future. A list of participants is included. FTP

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9.16

high as 400 p/m. Of seemingly more importance to the closed-system fish farmer would be critical first symptom levels such as the concentration values of total ammonia when fish go off feed (30 p/m). The farmer should maintain the ammonia level below 30 p/m to avoid symptoms of ammonia poisoning, although the results of the study indicate that channel catfish can tolerate higher levels for short periods of time.

[2 figures, 1 table, 5 references] Partially abstracted; partially reprinted

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9.16 INORGANIC NITROGEN REMOVAL IN A COMBINED TERTIARY TREATMENT-
(9.19)(6.39) MARINE AQUACULTURE SYSTEM. I. REMOVAL EFFICIENCIES

Goldman, Joel C., Kenneth R. Tenore, John H. Ryther, and N. Corwin (Woods Hole Oceanogr. Inst., Woods Hole, Mass.)
Chemical Abstracts 80, No. 16, 87201q (Apr. 22, 1974)

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9.17 FOOD-RELATED ENERGY REQUIREMENTS
(9.2)

Hirst, Eric (Oak Ridge National Laboratory, Oak Ridge, TN 37830)
Science 184, No. 4133, 134-138 (Apr. 12, 1974)

An analysis was made of the impact of food on energy consumption, a necessary step in evaluating methods to increase the efficiency of energy use in delivering food to the consumer. Also, these data can be used to assess the impact of increased fuel prices on food prices.

The energy used by the U.S. food cycle (that is, the energy required to grow, process, transport, wholesale, retail, refrigerate, and cook food) is about 12% of the total national energy budget. The residential sector is 30% of this total, and thus it is the most energy-intensive sector in terms of energy consumed per dollar of food-related expenditure. The food-related expenditures in homes are mostly for fuel to operate kitchen appliances and automobiles. The amount of electricity consumed in these activities is 22% of the total amount used in the United States; one-half of this amount is used in homes, and more than two-thirds is used in the trade and household sectors.

Judging from past trends, it would appear that the energy used in food-related activities will continue to increase at a faster rate than the population, because of use of processed foods, purchase of meals away from home, and use of kitchen appliances equipped with energy-intensive devices. But, fuel shortages, increasing fuel prices, the increasing need to import oil, and other problems would indicate that such past trends may not continue. FTP

9.17 (9.2) SOME CRITICAL REMARKS ON THE USUAL APPROACHES TO ECOLOGICAL MODELLING

Margalef, Ramón (Instituto de Investigaciónes Pesqueras, Paseo Nacional, s/n, Barcelona (3), Spain)
Investigación Pesquera 37, No. 3, 621-640 (Dec. 1973). Instituto de Investigaciónes Pesqueras, Paseo Nacional, s/n. Barcelona-3, Spain [In English; Spanish summary]

A mathematical model is an intellectual conception that purports to reflect the structure and operation of a system. The literature on models of ecosystems is heavily redundant and real progress has not been made since the work of V. Volterra [Mem. reale Acad. Nazl. Lincei. Clase Sci. Fish. Mat. e Nat., ser. 6, 2, 31-112 (1926)], A. J. Lotke [Elements of Mathematical Biology, 465 pp., Dover Public., Inc., New York (Repr. 1965)], and G. A. Riley, H. Stommel, and D. F. Bumpus [Bul. Bingham Oceanogr. Coll. 12, No. 3, 1-169 (1949)]. Mathematical models are necessary, but they must help to create ideas and not just feed computers. The author suggests that apparently sophisticated models based upon inexact basic assumptions can hinder progress and impair the ability or the pretense of understanding nature. The author states that this suggestion could be interpreted as the envious remarks of someone who is unable to follow the mathematical approach and seeks sympathy from fellow field ecologists. But the author insists that nature can be seen in different ways and that usual model building interprets only a small and biased part of what is known about the workings of ecosystems. In addition to frequent criticsms and models with regard to linearity, time lags, and



9.17 ARTIFICIAL REEFS

Stone, Richard B. (National Marine Fisheries Service, NOAA, Atlantic Estuarine Fisheries Center, Beaufort, NC 28516)
Sea Frontiers 20, No. 1, 25-33 (Jan.-Feb. 1974)

Much of the area of the continental shelf is relatively barren consisting of a flat sand or mud bottom, with few hard irregular surfaces. The more productive areas of the shelf consist of irregular bottoms and are the habitats of valuable reef fishes. Coral reefs, rock ledges, wrecks, and similar irregularities are well known as productive fishing grounds. The areas with these features are productive because other organisms such as algae, barnacles, hydroids, sponges, corals, and mussels are attracted to and settle on the irregular substrate and become a source of food for many fishes. These areas are attractive to fishes also because they offer shelter, spawning grounds, and visual reference points (or landmarks). The natural reef habitat provides the shelter of holes, ledges, and dark corners, which offer to fish places of concealment from predators. The reef also provides areas of calm water or favorable currents by damping and deflecting damaging currents and waves. These calm areas, upwellings, and eddies are used by the fish to conserve energy. In addition, species that exhibit strong homing tendencies may rely on the landmarks provided by the irregularities on the bottom to locate their territory.

Artificial reefs are manmade objects or natural objects intentionally placed in selected areas of the shelf to duplicate the natural conditions that attract the invertebrates and the fishes. Artificial reefs provide new feeding grounds and establish new areas for fish having territorial behavior. A new habitat has



9.19 RESIDUES OF DDT IN LAKE TROUT (SALVELINUS NAMAYCUSH) AND COHO SALMON (ONCORHYNCHUS KISUTCH) FROM THE GREAT LAKES

Reinert, Robert E., and Harold L. Bergman (Bureau of Sport Fisheries and Wildlife, Great Lakes Fishery Laboratory, Ann Arbor, MI 48107)
Journal of the Fisheries Research Board of Canada 31, No. 2, 191-199 (Feb. 1974)

The purpose of this study was to provide data on the levels of DDT residues accumulated at different life stages of certain species of fish. Determinations were made of DDT residue levels in lake trout of various lengths from Lake Michigan and Lake Superior, in coho salmon of various lengths from Lake Michigan and Lake Erie, and in eggs and fry of lake trout and eggs of coho salmon from Lake Michigan. Also, a comparison was made of the concentrations of DDT residues and the percentages of oil in adult coho salmon (whole fish, steaks, portions of steaks, and brains) from Lake Michigan with those in coho salmon collected from the Platte River during their spawning migration. The results indicated that the concentrations of DDT residues in fish may vary widely with species, life stage, size, and tissue of fish, as well as with season and locality of catch.
[1 figure, 4 tables, 20 references] FTP



9.19 (6.13) REMOVAL OF CHLORINATED PESTICIDE RESIDUES FROM CRUDE OILS AND FATS BY PROCESSING

Kanematsu, Hiromu, and Kenzi Chimi (Japan Institute of Oils & Fats, Other Foods Inspection, Foundation, 27-8 Nihonbashi-Hamachō, 3-Chōme, Chūō-ku, Tokyo, Japan), Takenori Maruyama, Isao Niiya, Masao Imamura, Keiichi Ōshiba, Hyōzō Kawakita, and Tarō Matsumoto
Journal of the Japan Oil Chemists' Society 23, No. 1, 49-52 (Jan. 1974) [In Japanese; abstract and tables in English]

The removal of chlorinated pesticide residues from four crude animal and eight crude vegetable oils and fats in the process of their manufacture was determined. The crude vegetable oils had less chlorinated pesticide residues than [illegible]e crude animal oils. The residue levels were not reduced during the deacidi[illegible] and decolorizing process, but a considerable reduction in the levels was [illegible]d in the hydrogenating and deodorizing process. The chlorinated pesticide residues in the animal oils were more effectively reduced in the manufacturing process than were those in the vegetable oils.
[3 tables, 10 references] FTP

9.17

the potential for both increasing the distribution and abundance of these fish. The design of the artificial reef is an important determinant in the species of fish it can attract; for example, large holes in the reef will attract large fish. In addition, a reef with a high profile will attract more pelagic fish than that with a low profile. Manmade reefs can be used to restore the productivity of nearshore areas that have been destroyed by pollution or dredge and dumping operations. Many nontoxic solid wastes have been tested for use as artificial reefs by the California Dept. of Fish and Game on the west coast and the National Marine Fisheries Service on the east coast. The objects used in the tests included junked automobiles, damaged concrete pipes, scrap tires, old ship hulls, streetcars, and building rubble. The results indicate that old ships and barges make excellent artificial reefs because their high profiles induce upwellings and eddy currents that attract baitfishes and large predators. The cost of bringing old junk to the ocean sites can be a limiting factor. Scrap tires are the best material for artificial reefs because they do not deteriorate and are nontoxic. There are 114 approved artificial reef sites along the east coast; on 43 of these sites about 600,000 scrap tires have been used. Nearly 1 billion more tires could be used to build up the remaining sites. Information on how to acquire permits and to build reefs can be obtained from National Marine Fisheries Service, Atlantic Estuarine Fisheries Center, P.O. Box 570, Beaufort, NC 28516.
[9 photographs] SW

9.17 (9.2)

aspects of the environment reported elsewhere, the author discusses two other faults of modeling: space is neglected in the basic assumptions, and the system is assumed to be closed. The author suggests that both assumptions invalidate most of what is expected from models. The author criticizes the inadequacy of the equations derived from V. Volterra and A. J. Lotke [ibid] because they make no reference to any point in space. In addition, the equations do not give a measure of the interaction of the animals in space.

In the matter of closed versus open systems, the usual models are closed in what concerns matter and open in what concerns energy. In this manner, the system reaches a fixed final state as fatally as, in thermodynamics, a closed system approaches a state of maximal entropy (unavailable energy). What awakens the reactivity of the system and drives it to a new status has to be considered as an unpredictable external input. Such a model must be enlarged to include some hint on how the system changes according to inputs or driving functions. The author discusses further: the use of current models; suggestions for complementary approaches including aspects of maturity, stress, and divisibility of systems; stability and succession; and an example of the importance of size in productivity models.
[9 references] SW

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9.17 FISH ESCALATOR

Ogden, Stanley E. (Box 618, Mill City, Oreg.) (pat.)
U.S. Patent 3,783,623
Official Gazette of the U.S. Patent Office 918, No. 2, 577 (Jan. 8, 1974)

This enclosed endless conveyor-type fish elevator is used for carrying fish upstream over or through a dam. FTP

9.19 (9.17)(9.6) OIL AND THE OUTER COASTAL SHELF. THE GEORGES BANK CASE

Ahern, William R., Jr. (The Rand Corporation)
Ballinger Publishing Co., Cambridge, Mass. (1973), xiv + 133 pp.

This analysis is also a dissertation presented by the author to meet the requirements of a Ph. D. degree at the Kennedy School of Government, Harvard University. The analysis elucidates the problems that would appear if Georges Bank, a rich fishing area, were opened to oil and gas exploration. Representatives of the oil industry wanted to lease Georges Bank for petroleum development, and fishermen and environmentalists from New England and New York were opposed to granting the leases. The topics covered in the book are as follows:

Chapter 1, "The Decision Problem and Possible Outcomes"; Chapter 2, "Oil and Gas Under Georges Bank" is a discussion of the geology and the estimates of petroleum supply in the area; chapter 3, "Economic Aspects of Possible Outcomes" covers oil and gas economics; chapter 4, "Environmental Aspects of Potential Oil and Gas Development on Georges Bank" contains discussions of oil spills relative to marine life, human health, and oceanography; chapter 5, "Major Findings and Recommendations Based on Economic and Environmental Considerations"; and chapter 6, "Legal and Political Considerations" covers boundary disputes, meeting environmental law standards, and modes of tenure with arguments in support of and opposition to leasing. The author listed the sources he consulted, and an index concludes the book.
SW

9.19 EFFECTS OF DIETARY MERCURY AND LEAD ON EGGSHELL THICKNESS IN MALLARDS

Haegle, M. A., R. K. Tucker, and R. H. Hudson (U.S. Bureau of Sport Fisheries and Wildlife, Denver Wildlife Research Center, Denver, CO 80225)
Bulletin of Environmental Contamination and Toxicology 11, No. 1, 5-11 (Jan. 1974)

During recent years, the eggs produced by the brown pelicans on Anacapa Island off California have produced thin-shelled eggs. As a result, the eggs have collapsed during their early incubation period. It was postulated that such eggshell thinning of the wild pelicans may be due to their hypersensitivity to DDE or to the synergistic effect of other pollutants with DDE in the environment. Therefore, tests were carried out to determine whether lead and mercury (both biologically active and common in the environment) in the diet of captive mallards would increase eggshell thinning above that caused by DDE alone. In these feeding tests lead and mercury were fed at much higher levels than those found in the field in order to maximize their possible effects on eggshell thinning.

DDE alone caused a 15% reduction in the thickness of the shell of the eggs of the mallard, but neither mercury nor lead had any significant effect on eggshell thinning. Also, there was no apparent synergistic or additive effect of mercury or lead when fed in combination with DDE. Although the results indicate that mercury and lead do not contribute to eggshell thinning of wild brown pelicans, the authors believe that they still could act synergistically with DDE in the particular species. Nevertheless, they believe it more likely that innate differences in reproductive physiology, or that differences due to contaminants or stresses, may have contributed to the greater degree of eggshell thinning attributed to DDE in the wild brown pelicans on Anacapa Island.
[2 tables, 22 references] FTP

9.19 (8.42) MERCURY IN STRIPED BASS AND BLUEFISH

Alexander, J. E. (Chemical Oceanography, New York Ocean Science Laboratory), J. Foehrenbach, S. Fisher, and D. Sullivan
New York Fish and Game Journal 20, No. 2, 147-151 (July 1973) [Dept. of Environmental Conservation, Wildlife Research Laboratory, Delmar, NY 12054]

The mercury level was determined in bluefish and striped bass taken in the vicinity of Montauk Point on Long Island, N.Y. There was a direct correlation between the mercury content of the flesh and the weight of the fish for both species. The flesh of bluefish which weighed less than 2.4 kg showed mercury levels below 0.5 mg/kg; the flesh of those which weighed 2.4 to 5.6 kg showed levels fluctuating below and above 0.5 mg/kg. All samples of bluefish weighing more than 5.6 kg had mercury levels above 0.5 mg/kg. The corresponding weight categories for striped bass showing the stated mercury levels were: less than 3.2 kg, between 3.2 and 5.7 kg, and more than 5.7 kg, respectively.
[3 figures, 8 references] FTP



9.19 (9.17) THE DISTRIBUTION AND ABUNDANCE OF ANIMALS AND PLANTS ON THE ROCKY SHORES OF BANTRY BAY

Crapp, G. B. (Dept. of Zoology, University College, Cork, Ireland)
Irish Fisheries Investigations Series B (Marine), No. 9 (1973), 35 pp. Government Publications Sales Office, G.P.O. Arcade, Dublin, Ireland.

In 1968 a terminal became operational for the transhipment of crude oil on Whiddy Island in Bantry Bay (Ireland). Crude oil is pumped ashore from 300,000-ton tankers; the oil is then pumped from the shore tanks into smaller vessels lying in the bay for transportation to other European ports. This terminal may be followed by the construction of other terminals; there is some risk that oil pollution may damage the amenities in the area including an unspoiled and beautiful coastline and a small but growing fishing industry.

In the first 3 years of tanker operation only one moderately large oil spill and three small ones have occurred. To provide the means of detecting any effects that pollution might have on the marine ecology of the bay, a biological survey was undertaken. The initial stage of the investigation has been the making of a survey of the distribution and abundance of the fauna and flora of the rocky shores in the bay using the transect method of J. Moyse and A. Nelson Smith [Fld. Stud. 1, No. 5, 1-31 (1963)] from the abundance scales devised by D. J. Crisp and A. J. Southward [J. Mar. Biol. Ass. U.K. 37, 157-208 (1958)]. Forty sites were selected in and around Bantry Bay, and on each a transect was made from mean low water of spring tides to the top of the supralittoral zone. A list of more than 60 common littoral species was made, and at each station the abundance of these animals and



9.19 (1.951) MERCURY IN TISSUES AND LICE OF NORTHERN FUR SEALS

Kim, Ke Chung, Richard C. Chu, and George P. Barron (Pennsylvania State University, University Park, PA 16802)
Bulletin of Environmental Contamination and Toxicology 11, No. 3, 281-284 (Mar. 1974)

Marine carnivores are in the highest trophic level of the marine ecosystem; the northern fur seal subsists solely on marine fishes and invertebrates. Residues of chlorinated hydrocarbon pesticides have been found in the northern fur seals. In this paper, the authors report on the detection of mercury in the nursing cow, newborn pups, and suckling pups of the northern fur seal (Callorhinus ursinus) and in two species of sucking lice, Antarctophthirus callorhini and Proechinophthirus fluctus, which are parasitic on the fur seal. The tissues examined were the hair, blood, and milk of the nursing cows, the hair and blood of the pups, and the whole lice. Mercury analysis was by flameless atomic absorption spectrophotometric technique. Some of the data are shown in the table that follows:



9.2 POSSIBLE IMPACTS OF UNITED STATES DOMESTIC ENVIRONMENTAL POLICIES ON LESS DEVELOPED COUNTRIES' TRADE, INVESTMENTS, AND FOREIGN AID

Gibson, James A. (Dept. of Economics, Iowa State Univ., Ames, Iowa)
Environmental Affairs 3, No. 1, 109-127 (1974)

The United States has undertaken environmental control and pollution abatement programs to achieve national objectives; however, the domestic environmental policies involved can have both favorable and adverse impacts on the economic development of less developed countries (LDC's). Some possible major impacts are increases in tariff barriers on exports of the LDC's, diminished demand for raw materials from the LDC's, increase in prices of imports from the LDC's, and a tendency to transport inappropriate technology to the LDC's. In some areas, U.S. domestic environmental policies may open up new favorable possibilities for the LDC's by, for example, use of the natural products (available from the LDC's) at the expense of the synthetic products. To enable the LDC's to take full advantage of the fresh opportunities that may arise and to minimize any extra burdens that the domestic U.S. environmental policies may have on the LDC's, the author concludes that the United States will have to incorporate the adverse impact of domestic environmental programs on foreign economies into the developmental assistance programs for the LDC's.
[33 footnotes] FTP

9.19 (1.951)

| Seals | Mean mercury content (µg/g) in: | | | | |
|---|---|---|---|---|---|
| | Hair | Blood | Milk | Sucking lice | |
| | | | | A.c. [1] | P.f. [1] |
| Nursing cows | 4.87 | 0.0995 | 0.0145 | -- | -- |
| Pups, newborn | 3.68 | 0.0195 | -- | 0.221 | -- |
| Pups, 2 months of age | 5.36 | 0.0686 | -- | 0.630 | 0.513 |

[1] A.c. = Antarctophthirus callorhini
P.f. = Proechinophthirus fluctus

Hair contained higher levels of mercury than did the blood, milk, and lice. The low level of mercury in the blood of pups led to a low mercury content in their hair and in their parasitic lice; the high level of mercury in the blood of pups led to a high level of mercury in their hair and their parasitic lice. The authors suggest that further tests should be made to determine whether the mercury content of the hair of the seals and the parasitic lice may serve as a reliable index of the mercury level in this marine animal.
[1 table, 19 references]

FTP

9.19 (9.17) POTENTIAL BIOLOGICAL EFFECTS OF HYPOTHETICAL OIL DISCHARGES IN THE ATLANTIC COAST AND GULF OF ALASKA

Moore, Stephen F., Gary R. Chirlin, Charles J. Puccia, and Bradley P. Schrader (Dept. of Civil Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139)
Report No. MITSG 74-19, Sea Grant Program, Massachusetts Institute of Technology, Cambridge, MA 02139 (Apr. 1, 1974), v + 121 pp.

This report is an assessment of the primary biological effects of potential oil discharges resulting from hypothetical oil production activity on the outer continental shelf (OCS) of the Atlantic and Alaska Gulf coasts. The results in the report are intended for the President's Council on Environmental Quality as part of an information base to decide whether or not to recommend oil exploration or drilling in these areas. The authors have analyzed the specific biological consequences of hypothetical oil discharges from 22 drilling sites on the OCS and from 3 nearshore Atlantic terminal sites. Results of the analysis indicate that the ecological risks from oil spills on Georges Bank and the Southern Baltimore Canyon are lower than for those in the Gulf of Alaska and the Georgia Embayment. All nearshore oil spills would entail high environmental risk, and spills at the terminal sites might cause environmental changes that would be detectable for 3 to 10 years. The report gives a comprehensive survey of the possible effect of oil spills on the organisms and habitats of the ocean and coastal zone and provides data and qualitative predictions necessary for evaluating the environmental impact of offshore oil drilling.

SW

9.19 (9.17)(1.32) REMOVAL OF FISH-TOXIC ORGANIC SOLUTES FROM WHOLE KRAFT EFFLUENT BY BIOLOGICAL OXIDATION AND THE ROLE OF WOOD FURNISH EXTRACTIVES

Rogers, I. H., and H. W. Mahood (Pacific Environment Institute, West Vancouver, British Columbia, Canada)
Technical Report No. 434, Fisheries Research Board of Canada, West Vancouver, British Columbia, Canada (Jan. 1974), 43 pp.

The problem of identifying compounds, toxic to fish, in the effluent from a kraft process paper mill, and the effect of biological oxidation (before discharge) on these compounds was investigated. Analysis of 110 samples of effluent, before treatment in an aerated stabilization basin and after treatment, indicated that the resin acid content was reduced 72% after 29 h of treatment, and 94% after 99 h. Unsaponifiable compounds in the effluent were reduced 43% after 29 h of treatment and 50% after 58 h. Fatty acid levels in the effluent were low. Unsaponifiable compounds in 23 of 47 samples tested caused mortalities in sockeye salmon smolts. This toxicity is due to the presence in the effluents of diterpene aldehydes and ketones. These compounds are closely related to resin acids which are toxic to sockeye salmon smolts. The diterpene aldehydes and ketones originated from the wood extractives of lodgepole pine; the corresponding unsaponifiable fractions of Douglas fir and white spruce wood are much less toxic. Chlorinated compounds were not detected in the effluents from the pulp mill. The presence of deresinating agents of the nonionic surfactant type were detected in the effluents by a qualitative method that was developed. In high concentrations, these compounds are capable of causing fish mortality, but their identification in this investigation could not be definitely determined using the available techniques in gas chromatography and mass spectrometry.
[9 figures, 5 tables, 16 references]

SW

9.19 (9.17)

plants was assessed in terms devised by D. J. Crisp and A. J. Southward [ibid]. The groups of animals and plants came under the following categories: Lichens and "lithothamnia"; algae; barnacles (except Balanus perforatus); B. perforatus, limpets and periwinkles; topshells, dogwhelks, anemones, and sea urchins; mussels; and Pomatoceros triqueter and Spirorbis species (marine worms). The abundance was checked at regular vertical intervals on the transects, and the distribution patterns of the species were described.
[12 figures, 1 table, 35 references]

MS

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9.19 MERCURY IN THE ATLANTIC AROUND ICELAND

Gardner, Doris, and J. P. Riley (Dept. of Oceanography, University of Liverpool, P.O. Box 147, Liverpool L69 3BX, England)
Journal du Conseil 35, No. 2, 202-204 (Feb. 1974)

Data are presented on the distribution of mercury in the water column in the North Atlantic around Iceland. The sampling was carried out at nine stations around Iceland. Analysis of the samples for mercury content was by atomic absorption spectrophotometry. The method resembled that of Y. K. Chau and H. Saitoh for the analysis of mercury in lake waters [Environ. Sci. Technol. 4, 839-41 (1970)], but was modified for use on sea water.

The table of data shows the latitude and longitude of the sampling station, total depth at the sampling station, water mass involved, sampling depth, and the temperature, salinity, and mercury concentration of the sea water. The mercury concentration of the North Atlantic seawater from around Iceland ranged from 12 to 225 ng $l^{-1}$.

[1 figure, 1 table, 13 references]

FTP

9.3 ISSUES BEFORE THE THIRD UNITED NATIONS CONFERENCE ON THE LAW OF THE SEA

Knight, H. Gary (Dept. of Law and Marine Sciences, Louisiana State University, Baton Rouge, LA 70803
Louisiana Law Review 34, No. 2, 155-196 (Winter 1974)

In 1974, various nations of the world will convene in Caracas, Venezuela, to consider the international law of the sea. In this article, the author describes the events which led to the Conference, and he identifies the major issues which will be dealt with at the Conference. The sections of the article consist of: I. Background (History of the Law of the Ocean Space; The 1958 and 1960 United Nations Conferences on the Law of the Sea; Problems With Existing Law of the Sea; The Maltese Initiative--1967). II. Procedural Developments, 1967-1973 (The Seabed Committee; The Third Conference; The Agenda; The Players). III. Substantive Issues Before the Third United Nations Conference on the Law of the Sea (Non-Living Resources; Living Resources; Territorial Sea Breadth; Navigation; Pollution; Scientific Research). IV. Conclusion--a Comment on Procedure and Some Likely Outcomes.

The appendix contains a copy of: Annex A, United Nations: Seabed Committee List of Subjects and Issues to be Discussed at the Law of the Sea Conference (Aug. 16, 1972), List of Subjects Relating to the Law of the Sea. Twenty-five subjects and issues are listed, some of which are (1) International Regime for the Seabed and the Ocean Floor Beyond National Jurisdiction; (2) Territorial Sea; (3) Contiguous Zone; (4) Straits Used for International Navigation; (5) Continental Shelf;



9.3 MARINE POLLUTION -- A FRAMEWORK FOR INTERNATIONAL CONTROL (9.19)

Danzig, Aaron L. (Nemeroff, Jelline, Danzig, Paley & Kaufman, New York, N.Y.)
Ocean Management 1, No. 4, 347-379 (Dec. 1973) [Elsevier Scientific Publishing Co., P.O. Box 211, Amsterdam, The Netherlands]

The author suggests that nothing short of international measures are needed to avert the grave danger threatening the marine environment. These threats arise from the effluents of the rivers, contaminants from the air, and irresponsible discharges by man operating at sea. These international measures, he suggests, should be backed by strong enforcement machinery, otherwise they will be ineffective. The article includes a proposed model treaty governing pollution of the marine environment that shows how some of the suggestions proposed in his paper could be carried out in terms of specific Treaty provisions. The eleven articles of the proposed draft model treaty are: Definitions; Marine Pollution Authority; Prohibited Pollution; Licenses; Monitoring, Research and Technical Assistance; Budget of the Authority; Jurisdiction of the Authority; Civil and Criminal Penalties; Facilities and Personnel; The Marine Court; and signature provisions. [3 footnotes] FTP



9.3 FISHERY LIMITS AND THE LAW OF THE SEA (9.2)

[Various reports as listed below]
Fishing Industry Review 4, No. 1 (1974) (Quarterly report of the White Fish Authority, 10 Young St., Edinburgh, EH2 4JQ, Scotland)

The White Fish Industry Advisory Council at its annual meeting in Nov. 1973, debated the consequences for the British fishing industry if there emerged from the Law of the Sea Conference(s) a worldwide pattern of extended limits regimes. For the sake of the discussions an European Economic Community (EEC) limit of 200 miles was arbitrarily postulated. Four formal papers formed the framework of the debate, and they are reproduced in this issue of the journal. The papers are as follows:

"Fishery Limits and the Law of the Sea," by Iain MacGibbon (International Law, University of Edinburgh, Scotland), pp. 3-6. This paper is a brief assessment of the current international law on fishery limits and the lines along which it may develop in the future. [28 footnotes]

"Notes on the Prospects for British Fisheries for Conventional Fishery Resources from Possible Changes in Coastal State Jurisdiction over Fisheries," by B. B. Parrish (Director of Fisheries Research for Scotland), pp. 7-8. The author makes an assessment of the fishery stocks that would be included in a 200-mile fishery limit.

"Making the Most of the Fish Supply," by G. H. O. Burgess (MAFF Torry Research Station, Aberdeen, Scotland), pp. 8-11. This article is an assessment of how the



9.4 A REPORT TO: THE PRESIDENT AND THE CONGRESS (9.17)(9.3)

Nierenberg, William A. (National Advisory Committee on Oceans and Atmosphere, Washington, DC 20230)
For sale by the Superincendent of Documents, U.S. Government Printing Office, Washington, DC 20402 (1973), ix + 47 pp. $0.55.

In this second annual report, the National Advisory Committee on Oceans and Atmosphere (NACOA) discusses resource management organization, energy, the coastal zone, atmospheric affairs, and fisheries. The Committee made the following recommendations: (1) to obtain the best use of oceanic and atmospheric resources, responsibility for their management should be given a central focus and reorganized into a single Federal agency at the departmental level; (2) Intensified explorations and drilling should be undertaken offshore; single-point mooring deep-water oil terminals for landing foreign oil imports are preferable to multiple use superports and that such terminals should be operational by 1976 on the Gulf Coast and by 1978 off the East Coast; (3) The National Coastal Zone Management Act of 1972 (P.L. 92-583) should be funded to the full amount authorized by law and vigorous implementation pursued; (4) Increased priority should be placed on disseminating routine local forecasts and on monitoring public response to weather forecasts and warnings; (5) The many small programs in weather modification should be placed under NOAA's lead, and weather modification studies given higher priority; (6) Development of a national plan for use of the national fishery resources by the

9.3 (9.2)

available fishery resources could best be used through the substitution of species in the market, the use of new marine species, and the use of new processing techniques.

"Fisheries Resource Management Systems," by D. J. Garrod (MAFF Fisheries Laboratory, Lowestoft, England), pp. 11-14. The author briefly surveyed the various fisheries management systems that now exist. FTP

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9.4 (9.19)(9.3) TRANSNATIONAL POLITICAL INTERESTS AND THE GLOBAL ENVIRONMENT

Fearn, Anne Thompson (Dept. of Political Science, California State University, Fullerton, Calif.)
International Organization 28, No. 1, 30-55 (Winter 1974)

This report is a discussion of the involvement of transnational, nongovernmental associations in the international decisions leading to the 1972 United Nations Conference on the Human Environment at Stockholm, Sweden, and the establishment of the U.N. Environmental Program. The organizations involved are identified, characterized as to their political functions, and described relative to their points of access into the U.N. environmental policy process. Eight propositions about transnational associations are examined in light of the Stockholm experience. FTP

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9.4 (9.17)(9.3)

secretaries of Commerce and Interior; that international agreements should incorporate effective mechanisms for conservation and an awareness of the problem of uniform international enforcement; and continued support for the species approach in the coming Law of the Sea Conference; (7) The President should direct a reconsideration of high priority needs in ocean and atmospheric affairs as part of the 1975 budget review and restoration of selected reductions and postponments. SW

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9.3 ALTERNATIVE ARRANGEMENTS FOR MARINE FISHERIES. AN OVERVIEW

Christy, Francis T., Jr.
Paper No. 1 in a series prepared for The Program of International Studies of Fishery Arrangements, Resources for the Future, Inc., Washington, D.C. (May 1973), 91 pp.

In the past, fishermen have had free and open access to all stocks on the high seas beyond the narrow, national limits of coastal states. In the next few years the principle of freedom of fishing will disappear over most areas of the ocean. As representatives of states meet at the third U.N. Conference on the Law of the Sea to establish new fisheries regimes, their most important task will be to facilitate the change by minimizing conflict and waste. In addition to examples of economic waste, chapter I contains discussions on the fundamentals of fisheries, migratory fishes, maximum sustainable yields, economics of common property, and confusion between production and distribution. The various techniques of management programs are discussed in chapter II. Also discussed are management goals and alternative regulatory methods. The authority to impose management controls requires the states to address the problems of resource distribution. In chapter III distribution of wealth is discussed, including criteria, sets of interests, and resource distribution techniques. In chapter IV there are discussions on some of the ways in which states might organize themselves in establishing institutions to regulate, enforce, settle and research disputes. In chapter V, the general principles for fisheries arrangements are discussed. SW
[2 figures]

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9.3 THE DELIMITATION OF THE CONTINENTAL SHELF IN SOUTHEAST ASIA AND THE FAR EAST

Oda, Shigeru
Ocean Management 1, No. 4, 327-346 (Dec. 1973)

An unbiased analysis of the present situation of the delimitation of the continental shelf by the Committee for Co-ordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP) countries of Southeast Asia and the Far East (Indonesia, Japan, Khmer Republic, Republic of Korea, Malaysia, the Philippines, Thailand, and Republic of Vietnam) is given. This paper is based on a report submitted by the author to the CCOP at its ninth meeting at Bandung, Indonesia, late in 1972; the author was the legal consultant for the United Nations Economic Commission for Asia and the Far East. FTP
[3 figures, 20 footnotes]

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9.3

(6) Exclusive Economic Zone Beyond the Territorial Sea; (7) Coastal State Preferential Rights or Other Non-Exclusive Jurisdiction Over Resources Beyond the Territorial Sea; (8) High Seas; (9) Land-Locked Countries; (10) Rights and Interests of Shelf-Locked States and States With Narrow Shelves or Short Coastlines; (11) Rights and Interests of States With Broad Shelves; (12) Preservation of the Marine Environment; (13) Scientific Research; (14) Development of Transfer of Technology; (15) Enhancing the Universal Participation of States in Multilateral Conventions Relating to the Law of the Sea.
[101 footnotes] FTP

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9.3 JURISDICTIONAL PROBLEMS IN CANADA'S OFFSHORE

Beauchamp, K., M. Crommelin, and A. R. Thompson (University of British Columbia)
Alberta Law Review 11, No. 3, 431-470 (1973)

Two problems are being encountered as oil and gas exploration activities are beginning to concentrate in offshore regions of Canada: (1) international boundaries and (2) federal-provincial control over offshore resources. The first part of this report deals with the first problem. The authors analyze the historical origin of offshore rights, current international law on the subject, various methods of determining boundaries; and then they examine six of Canada's present boundary disputes and the corresponding position taken by the concerned countries in each case. The authors critically analyze the Offshore Minerals Reference case, and then they make a comparative study between Canada, Australia, and the United States with respect to the control, development, and exploitation of offshore resources.
[145 footnotes] FTP

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